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BRIEFLY TOLD.

FIELD'S ANALYSIS OF THE ACCOUNTS OF BRITISH GAS UNDERTAKINGS.—We desire to acknowledge the receipt from the author, Mr. John W. Field, Accountant to the Gas Light and Coke Company, London, of a copy of his analysis of the accounts of the principal gas undertakings in England, Scotland, and Ireland, for the year 1889. This is the 21st annual appearance of the "Analysis," and, as usual, it reflects the utmost credit on its clever and accomplished compiler, the accuracy of whose merits as an able accountant and "digester" are beyond question. To those who would keep themselves posted in respect to what is going on in British gas undertakings the "Analysis" is nothing short of invaluable; for a glance through its nicely arranged columns will enable the student of contemporaneous British gas history to determine just how the latter stands. No praise would be too great for Mr. Field's carefulness, nor no pecuniary return would be too large to reward him for his labor. A copy of it should be on the shelves of the library of every American gas manager who desires to have knowledge of what his English brethren are doing.

THE JONES METER AND STOVE COMPANY.—Hitherto we printed in the JOURNAL a brief mention of the fact that the firm of Bell & Jones had been dissolved by mutual consent, and we are now in receipt of advices that that firm has been replaced by the Jones Meter and Stove Company, who will engage largely in the manufacture of gas meters and gas stoves. The works and offices are to be at Royersford, Pa., and a charter has been applied for. The Company is capitalized in $100,000, and its officers are: President, S. Lewis Jones; Vice-President, B. I. Latshaw; Secretary, Wm. S. Essick (late Secretary of the Buckwalter Stove Company); Treasurer, S. B. Latshaw, of Nix and Latshaw. The Company is well equipped in the matter of manufacturing plant.

ABANDONING THE USE OF NATURAL GAS.—The wasteful and extravagant methods that attended the introduction, distribution, and use of natural gas in the large manufacturing concerns in and around Pittsburgh, Pa.—and other places as well—were well calculated to bring about a state of affairs which would end in disaster to the suppliers. That which comes easily is not regarded with the same favor nor held in similar esteem to that which is more difficult to secure, even though both have equal value for the results sought. And so it is with natural gas for fuel purposes. Thousands of millions of cubic feet were worse than wasted; prodigality was the the rule in its use; in fact, forming an opinion from the practices of those who supplied it and those who used it, the idea was to see which could outdo the other in recklessness. It seemed as if both suppliers and users had joined in the belief that there could be no end to the good thing that was thrown out in vast volumes from Nature's storehouse. The change came, however, and with it the time for paying up for past transgressions. Weakening pressures and diminished volume aroused the suppliers, who, with as much intemperance in their schemes for metering and increased payments as formerly characterized their lavishness and wastefulness, awoke to the fact that to keep in the swim they must regulate the flow of the tide. Their regulations grew so "pronounced" that the price was finally placed at a point

where the larger manufacturing concerns "looked backward" at their old servant, coal, which, it would seem, is again in a fair way to assume its sway in Pittsburgh. While we do not wish to be understood as saying that "King Coal" is to at once regain his supremacy in the "Smoky City," it is nevertheless true that his return is certain, although the immediate rate of progress may be slow. These remarks were brought out by advices received the other day from Pittsburgh, to the following effect: "The Pennsylvania Tube Company is preparing to abandon the use of natural gas in its works, and return to the use of coal for fuel purposes. At the present time 13 regenerator gas producer furnaces are being put in the works by the Smythe & Laughlin Company, some of which will be ready to use in about 30 days. The Company has had this in contemplation ever since the price of natural gas began to go upward, or to the point where it was a question whether its use was more economical than that of coal. Slack coal will be used for making gas in the regenerators. This is the first industrial institution in Pittsburgh to abandon natural gas entirely and to start to using manufactured gas for fuel purposes. Some other firms have the question under consideration." In the meantime there can be no doubt that the makers of artificial gas are under great obligations to the suppliers of natural gas, in that the prodigality of the latter taught the housekeepers of the natural gas districts much in respect to the intrinsic merits of gas as a domestic aid. And it may be accepted as an assured fact that when nature's product gives out, the artificial gas manufacturer will have rich fields to glean in.

PUBLIC LIGHTING, GRAND RAPIDS, MICH.—After much inquiry, "investigation" and buncombe, which involved the matter of committing the municipality to the operation of a lighting plant, the Committee on Lamps, of the Grand Rapids Common Council, reported in favor of awarding public lighting contracts, to last for one year, to the following contractors: The Grand Rapids Electric Light and Power Company, arc lamps (2,000-candle power), on a moontable, at $109.50 each, and a certain number of 16-candle power incandescents (to be used on bridges), at $16 per lamp; Grand Rapids Gas Light Company, gas lamps (to be lighted until midnight on a moontable), at $12 per lamp; Globe Light and Heat Company, standard lamps, in outskirts of city, to be lighted same as the gas lamps, at $14 per lamp. After some debate, in which it was intimated that there "was something in the standard lamp contract for somebody"—and the figures are of the "queer" sort, when it is remembered that the Gas Company only wanted $12 per annum for gas lamps—the report was adopted. In due time the awards came before Mayor Uhl for his concurrence, and that official, after due reflection, vetoed the standard lamp portion of the determination. The remainder received his approval.

THE Johnson Fuel Gas and Construction Company, of Topeka, Kas., has been chartered, with a capital of $300,000.

WILL METHUEN (MASS.) HAVE A SEPARATE GAS COMPANY?—The following interesting "item" comes to us from "Observer:" "About a fortnight ago a small audience assembled in the Town Hall of Methuen (which adjoins Lawrence), the occasion being the hearing before the Board of Selectmen on the petition of the Lawrence Gas Company for permission to lay pipes for gas and to erect poles and string wires for electricity in and over the streets of Methuen. The hearing was opened by C. A. De Courcy, Esq., who appeared as counsel for the petitioners and as one of the Directors of the Company. He spoke at length of the good financial standing of the Gas Company in Lawrence, the quality of light it was furnishing both there and in North Andover, and if permission was given they would immediately begin the placing of mains through the streets of Methuen for gas lighting purposes, and would also erect poles and other appliances for lighting by electricity. He stated that the Lawrence Gas Company had a legal right to light the town of Methuen from the Gas Commissioners just as soon as permission was granted by the Selectmen. The remonstrants to the petition consisted of Directors of the Methuen Gas Light Company, who were represented by T. Henry Pearse, of Boston. He stated that the Methuen Gas Light Company had been chartered by citizens of Methuen, and granted a franchise by the Selectmen about a year ago. The Company had recently purchased a lot of land in the town to erect a gas and electric light plant, and he thought the Selectmen should refuse to grant the petitioners a franchise to do business in the town. The Methuen Gas Light Company, he said, would soon be prepared to meet the demands of the town in the way of lighting. John Beatty, one of the Directors, objected to the granting of a franchise to the petitioners. He said that if his Company should be given an extension of time in its franchise they would put into Methuen taxable property to the amount of $25,000 or $30,000. He said the Methuen Gas Light Company would be operated by the citizens of Methuen, and the taxable property of the Company would benefit the town. Mr. De Courcy closed the hearing for the petitioners. He said the remonstrants had no legal right to protest against a franchise being granted to the petitioners. A Company whose franchise has expired, and which has not subscribed its capital stock, was invalid. It is a significant fact, he said, that out of the number of citizens who petitioned for a franchise for the Methuen Gas Light Company a year ago, only one is now interested in it financially. In order to legally do business in Methuen that Company must petition the Selectmen for a new franchise. It would be months before the Methuen Company would be able to operate its plant, and the citizens were greatly in need of better light. Grant the prayer of the petitioners, and the Lawrence Gas Company would within a week begin the work of preparing for a supply of gas and electricity, at cheaper rates than a separate Company could afford. The Selectmen reserved their decision, although it is likely the prayer of the petitioners will be granted. In fact, I fail to see how it can be ordered otherwise on the face of the arguments, since, according to their own confession, the projectors of the separate Methuen Company are playing to the letter the role of dogs in the-manger."

NOTES.—Col. A. H. Leftwich, President of the Spartanburg (S. C.) Gas Company, having completed the equipment of the gas works division of his property, is now putting the finishing touches to the electric annex, which is of the Schuyler type. The plant is rated to the supply of 50 arcs, of 1,500-candle power each.——The special committee appointed by the Binghamton (N. Y.) Common Council to inquire into the probable cost of operating a municipal electric lighting station has made its report. The presentment is made that the apparatus and material necessary for the supply of 180 arc and 400 incandescent lamps will cost $60,000. The operating expenses are put at $17,660 per annum, the same being said to include interest on bonds, a 3½ per cent. allowance for sinking fund, 2½ per cent. on "maintenance account," and 1 per cent. for insurance. The committee recommended that the city embark in the lighting business, and that a bill be prepared for introduction at the next legislative session permitting the city to so engage. The report was adopted.——The electric companies of Paterson, N. J., have consolidated, and the result is the following schedule of rates, the same to take effect from August 1st: Arcs (9 o'clock circuit), $10 per month; 11 o'clock circuit, $12 per month. The following discounts are allowed for prompt payment: 1 lamp, 5 per cent.; 2 and 3 lamps, 7½ per cent.; 4 and 6 lamps, 10 per cent.; 7 and over, special. Incandescent rates are: Meter rate, 1½ cents per hour, 16 candle lamps; contract rates (9 o'clock circuit), $1 for each 16-candle lamp; 11 o'clock rate, 16-candle lamps, $1.25, 20 candle lamps, $1.50; 12 o'clock rate, 16-candle, $1.50, 20-candle, $1.75. Discounts are as follows: Bills under $10, ten per cent.; between $10 and $20, twelve per cent.; between $20 and $50, twenty per cent.; over $100, twenty-five per cent.

The Market for Gas Securities.

The market for Consolidated gas was decidedly off during the week just closed, and under par was recorded several times. To-day (Friday) the shares are bid for at 99¾, holders asking par. There is no special reason for the decline (which, though slight, caused some anxious inquiry from over-anxious investors), unless it be the general midsummer dullness, which is more pronounced this season than ever. We are inclined, from surface indications, to think that a bear movement may shortly be inaugurated in Consolidated shares, but have no reason to doubt that such an attack cannot be successfully sustained for any length of time. Further, we venture the prediction that by Christmas week Consolidated will readily bring 110. Equitable is steady to strong, and we note a slight falling off in Mutual. Brooklyn shares are strong, with indications, however, that top prices have been very nearly reached there. Bay State gas (Boston) is virtually at 90, and well-informed people are of the opinion that this property is soon to pass into the control of the American Gas Investment Company. Chicago gas is in demand around 55, and it certainly looks cheap at that figure. Laclede common is at 21 to 22. We understand that the authorities of Binghamton (N. Y.) propose to install a municipal electric lighting station, and that this move will be followed by several cities and towns of the State. Perhaps this agitation, which is likely to become quite pronounced during the next session of the Legislature, may hurry up the separate lighting interests of the State to combine for the purpose of securing a State Board of Gas and Electric Light Commissioners. Pacific Coast gas shares are looking up, which is not to be wondered at when the earnings of the Companies, and the growth of their business, are considered.

[A Paper read Before the British Gas Institute.]

Recent Improvements in Stoking Machinery.

By Mr. John West.

Papers referring to the improvements that have been made from time to time in labor-saving machinery for the retort house, have been read before the members of this Institute at previous meetings. Therefore my subject cannot lay claim to originality; yet it is one which I believe will be useful and engage your special attention. I have now been intimately connected with the development of machine stoking for upwards of 20 years, during which time I have experimented with, and perfected many means to solve what is generally admitted to be a difficult problem; and I have, at the same time, met many mechanical and human obstacles in my path, to bar the progress of this important branch of gas industry.

The present paper is entitled "Recent Improvements in Stoking Machinery;" but I think it will not be out of order for me to briefly mention the earlier developments of the machinery, so that you will understand why I have concluded to adopt certain principles which I believe are the basis of a proper system for dealing mechanically with the coal from the coal stores to the retorts.

In the first place, I may remark that the machinery has now assumed an entirely different form to that which I conceived in my first endeavors to grapple with the subject of mechanical stoking. I then thought that the principle upon which it was advisable to work was a continuous system of feeding the coal and withdrawing the coke from the retorts. And I daresay some of my friends here will remember that I succeeded in carrying out my object, as far as the mechanical arrangements were concerned. Practical experience, however, with this principle soon proved to me that there were many objections against it; and I therefore gave my time, not to supersede manual labor in its entirety, but to invent a mechanical contrivance whereby the lot of the stoker should be made more pleasant, by dispensing with the hard labor of hand-stoking and arranging some means which would not entail such exposure to the heat of the retorts when charging or drawing them. At the same time I had in view the financial question of the reduction in the cost for labor, as I could not expect gas companies and corporations to adopt my system unless I could prove that there would be a substantial saving in the cost of carbonizing. There was, however, plenty of margin for this reduction in cost, as I well knew that a greater saving in labor could be effected in the retort house than in any other department of a gas works. I am pleased to say that my endeavors to economize the cost of retort house work have proved a success, as the accounts of the various gas companies and corporations who have adopted my system will show. I have, of course, met many sceptics, and those who actually said that further economy was unnecessary, because they were, under the old system, enabled to pay maximum dividends, and what did they want more than that?

But times are changed, and we have competition in the field; and I have no doubt that every one of you has given the subject of economy his earnest attention, and will endeavor to economize wherever it is possible, and adopt labor-saving machinery to its fullest extent. Those of you who have assisted me by adopting stoking machinery, deserve not only my thanks, but the thanks of the gas industry at large; for without their co-operation, we should not be in the position we are to grapple with the want of the present day in respect to the labor question.

I found that, in order to work the stoking machines successfully, it was necessary to prepare the coal by breaking it to an uniform size before it was dealt with by the charging machine; and I doubt whether any stoking machinery would be complete unless the coal was mechanically dealt with from the coal store to the retorts. For this purpose I fix an engine and coal breaker in the coal store, and arrange if possible to tip the coal direct from the railway wagons to the coal breaker (which is fixed in a pit below the ground line of the coal store); and by arranging for a systematic and regular delivery of the coal to the coal store, we here commence to effect the first economy by dispensing with a number of the coal wheelers and trimmers who are indispensible with hand labor. Here I wish to remark that, when designing coal stores, it will be found of great advantage if the coal can be brought into the coal store by an overhead railway. Economy has also been effected by adopting a plan of tipping the coal out of the railway wagons, by hoisting one end of the wagon until it is sufficiently high to shoot the coal out at the other end. This can be effected by a power traveling crane, as employed at the Rochdale Road Gas Works, Manchester; or by a fixed hoist designed by Mr. Baker at the Reading Gas Works. Where the overhead coal wagons are pushed about by the men, they may be made to tip, or have side or end doors to open. Of course, this is not always applicable, as the arrangement and working of the coal stores in many gas works are so varied, owing to the method adopted for bringing the coal to the works, that it would be impossible to lay down one universal system. Some works are so situated that the coal has to be carted to them and stacked by shovels. This system can be greatly improved upon by stacking the coal by means of elevators and overhead conveyers. The coal would be deposited from the carts to an engine and coal breaker fixed at the end of the coal store; and the breaker would reduce the large lumps to a size that could be safely elevated and conveyed to any part of the coal store. In some cases, where the coal is mostly small, we arrange an automatic screen to pass all that is of a suitable size, and only break the large lumps left from the screen. Mr. W. A. Valon, of Ramsgate, some years ago designed a coal store to save the expense of stacking; and the machinery for the purpose was made and erected by us. The coal is all carted to the works and tipped over the mouth of a coal breaker, from which an elevator conveys the coal to a high point in the center of the store, and delivers it on a distributing plate spreading the same to all parts of the store. Mr. Valon has obtained good results as to the economy of this system, which dispenses with the coal wheeling and trimming. Where coal stores are so situated that overhead railways are inadmissible, I am satisfied that a large number of them would be worked with advantage if a system of elevating and conveying machinery was introduced.

With stoking machinery, it is not necessary that there should be any particular arrangement of the coal stores in relation to the retort house. For instance, there need only be a coal store on one side of the retort house, or on both sides, or at both ends, or at one end, or even completely detached from the retort house—because the coal can be conveyed very cheaply from any convenient place to the retort house. There are many examples of all these systems working successfully at the present time.

From the coal stores, the coal is elevated into large fixed hoppers in the retort house. These hoppers should be arranged in the best position to dispense with as much as possible of the traveling about of the machines to obtain their supply of coal, for it must be borne in mind that we want to economize the labor of the machines as much as possible, in order to obtain the full advantage to be gained by them. For these reasons, I have considered it advisable to include in this paper several notes in connection with the arrangement of retorts and mouthpieces, as when they are defective they prevent us obtaining full benefit from the machinery.

In the early stages of the development of machine stoking, I found one serious bar to progress in the multitudinous sizes and shapes of retorts in use; and in spite of all that has been done since in other departments of engineering to arrive at a satisfactory standard, I find this trouble of want of uniformity still existing. One engineer pins his faith to a retort of oval section; another to a very small ⌂; another to a very large ⌂—and it is truly surprising to note the extreme tenacity with which the alteration of ½ inch in size in either direction will be opposed, as though there was no doubt about the unwisdom of such a proceeding. Yet at a neighboring works, using the same coal and working under precisely similar conditions, you will probably find the engineer equally convinced that it would be most unwise to change his section ½ inch in the opposite direction to that proposed to, and opposed by his neighbor. My power machinery is at the present time working on sizes so different as 20 in. by 13 in. ⌂ and 26 in. by 14½ in. ⌂; and as equally good results as regards gas making can be got from retorts varying so widely, I think I am justified in saying that a great deal of the confusion of ideas on a subject of such vital importance is due to the personal element. From large experience in the working of all kinds of settings, I am fully convinced that the best sizes of retorts for small and medium sized works, are those recommended by me when my manual machines were first introduced—viz., 21 in. by 15 in. ⌂, 21 in. by 15½ in. ⌂ or 22 in. by 15 in. or 16 in. ⌂; and these sizes will be equally suitable for working either with or without machinery. In larger works, where power machines can be economically employed, a somewhat larger variation can be allowed for. Any section of retort can be charged by these machines; but the sizes that will be found most suitable will be 21 in. by 15 in. oval, 20 in. by 15 in. ⌂, 21 in. by 15 in. ⌂, 22 in. by 15 in. ⌂ and 22 in. by 16 in. D.

In addition to these remarks about the size of retorts, and in connection therewith, I wish to call attention in the most earnest manner I can command to the size and section of the mouthpieces. No small detail about the retort house intended for machine working causes so much loss and worry as this, if the mouthpieces happen to be contracted in the smallest degree; and yet it is a thing which it is very hard to convince some people upon. For ordinary hand stoking a considerable contraction of section can be worked without much apparent detriment, although I contend that with hand work the practice is decidedly wrong.

But it must be remembered that the hand stoking rake is a small instrument taking out small pieces at a time with little power behind it to cause a choke, while the machine rake has a large head, and a deal of power to spend in ramming the coke fast into the mouthpiece should any obstacle or impediment to its free removal be met with. I have frequently found that, when I have had to work retorts with contracted mouthpieces, the addition of more power to the drawing machine, with the hope of expediting the work, has retarded it instead. No doubt exists in my mind that the expense of discarding these "bottle necked" mouthpieces and substituting for them others made of the same section as the retort throughout and about ½ inch larger all round, would be quickly and amply repaid. The men would be able to do much more work; and the wear and tear of the machinery would be greatly reduced.

It should be accepted as a principle by gas engineers that no alteration of the section of the out-flowing coke should be allowed under any circumstances. The moment any alteration of the section of the moving coke has to be made, some crushing up must take place. The crushing takes an appreciable interval of time and produces such a resistance to the moving coke further on in the retort as to break it up. It then eddies up all round the rake-rod, and a jam occurs; and the greater the power of the machine, the harder will the coke be rammed before the rake-rod is brought to rest. Then a succession of attempts have to be made before the coke is loosened; and the rake-rod finally comes out unduly heated, after wasting as much time as half a dozen retorts could be drawn in, and causing many unnecessary stresses on the machine. I have heard of a machine so powerful as to draw the coke in spite of a choke, and draw off the mouthpiece in doing so; but up to the present, I have endeavored to keep my machines with a less margin of power than sufficient to damage the retorts. All this trouble, gentlemen, astounding though it may be, arises from the small amount of taper in the wrong direction of ½ inch on each side of the mouthpiece.

With regard to stage or ground floor retort houses and machine work, a stage floor house is preferable—the coke to fall below the stage. To facilitate this, I fix a coke fender on the drawing machine, which shoots the coke below as it falls from the retort.

When designing a stage floor it should be borne in mind that the machines require to run upon rails; and if the floor plates and girders are properly arranged, the expense will be little more than for hand stoking.

With the introduction of generator and regenerator furnaces came the increased demand for stage floor retort houses; and I daresay some of you have had to solve the problem of converting an ordinary ground floor house, to a stage floor house, or building a stage floor, say 9 or 10 feet above the ground level of the works and floor line of the coal store. The most difficult part is how to communicate between the coal store and the retort house stage floor when they are not on the same level. The difficulty, however, is easily surmounted by the adoption of elevators and stoking machinery.

I have frequently been asked to apply my machines to existing retort houses, which are unsuitable for machine work. Sometimes the space available between the retort stack and the wall is not sufficient; and sometimes the shape and size of the retorts and mouthpieces are such that, if worked by machinery, the machines would not be able to produce such good results as under proper conditions.

The unsuitability of existing retort houses at first made the progress of the machines very slow, as the percentage of available houses was very small. The advance of time has made many changes in the right direction, and now I find engineers ready to listen to my proposals, when they are building new houses or making alterations to existing ones; and I believe that few modern retort houses are now being built or contemplated, which are not being arranged for the ultimate adoption of machine stoking. With this in view, we ought to have some excellent results when comparing the cost of machine work against the cost for wages now demanded by the men for hand stoking.

Of all the works with which I have had to deal in the introduction of machinery, Beckton is by far the most difficult to work. The retorts are very small, 20in. by 13 in. ⏛; the mouthpieces contracted from 20 in. by 13 in. ⏛ to 19 in. circular fronts. The coal is mostly of a kind that swells during carbonization; and the heats are high, requiring a large charge. It is difficult to put sufficient coal into such a small retort, and still more difficult to draw it out again, owing to the retorts being almost full of coke, which has to be drawn through a contracted mouthpiece. There is often not more than 2 inches between the coke and the top of the retort; and it is therefore almost as difficult to push the rake-rod in as it is to draw the coke out. When I first introduced the compressed air machinery to these works in the No. 1 retort house in 1884, I designed the drawing machine of a light and handy pattern, and slightly stronger than the machines which have for the last nine years done such admirable duty at the Manchester works, and the Whitwood Chemical Company, Normanton; but the Beckton work was so entirely different that these machines pulled themselves to pieces in less than six months. In Manchester we had a coal which, if anything shrinks in carbonizing. Retorts of a medium size—viz., 22 in. by 16 in. ⏛—are used, and mouthpieces made purposely to suit machinery. In other respects the Beckton retort house is admirably adapted for machine working; but the possibilities are much narrowed by the few but important defects in the retort stack.

The machinery which has been found most suitable for small and moderate sized retort houses is that known as the manual charging and drawing machines. These machines have, I believe, been brought to a state as near perfection as they can be, if we may judge from the fact that they have undergone very little alteration during the past few years, and have given universal satisfaction wherever they have been installed. As is well known, they depend more upon the strength of the stoker than do the other classes of machinery; but the skill required to work them is even less than with the power machines, as there are only a few simple movements to be made, and less mechanism to look after. The charger I use with these machines deposits the most perfect layer of coals in the retort that it is possible to imagine, and renders bad charging by unskilled men quite out of the range of possibility. Indeed, an expert man is far more likely to charge badly than a novice, because he learns tricks to save time by not letting the charger run its full course, or by turning the scoops over before the proper time.

The saving in cost of labor by these manual machines is such as to justify me in urging their universal adoption in all gas works where there are not sufficient retorts to employ economically the more costly power machines. I scarcely think it will be necessary for me to describe the methods of operation of these machines, as there is a great probability that the majority of my readers have seen them at work.

The next step in the development of the present power machine was the addition of the necessary parts for working the manual machine by compressed air. The machines first made were but little different to the manual kind; but additional strength was found necessary, and was added step by step, as the power was increased, until the compressed air machines differ but little from those driven by other powers. The transmission of power by compressed air has many excellencies to recommend it; but it is rather costly, and that is the sole reason why other means have been tried. The first machinery of this kind was erected at the Rochdale Road works of the Manchester Corporation in 1881, and is still doing good work on a large number of retorts. The compressed air is delivered to the machines from a fixed hose-reel by flexible hose exactly as described in a paper on this subject read before the Gas Institute, by Mr. John Somerville, in 1883. Many sets of this kind of machinery are working—including Manchester, South Metropolitan (Old Kent Road), Crystal Palace, Whitwood, and Sydney (New South Wales); and compressed air plants of a still more advanced form are working at Birmingham, Beckton and Belfast. In the latter kind of machines the charging is done by a long scoop, which does not rest upon any part of the retort, and delivers a larger quantity of coals than can be done by the charger of the manual type. These long scoops necessitated a long hopper to feed them, and more power to work them; and the additional weight to be propelled overpowered the hand method in use until then, and rendered it imperative to add mechanical means.

The next method tried was steam, with a boiler on each machine, rendering it quite independent of the rest. There were many advantages to recommend this system, and two serious faults against it. First of all comes the great additional weight, and then the additional care and greater skill required by the attendant to look after the boiler. After a little experience of this machine I decided that the driver ought not to be troubled with the thought of keeping up his own supply of power, but that he should only have to do with the actual working of the machine—the power being supplied by some means under the control of a person whose sole duty it would be to keep it constant. After long consideration I decided to adopt the rope system for the transmission of power; and the result of this, the latest step, I have now the pleasure of laying before you.

The first two sets of the rope-driven machines were erected under the supervision of Mr. S. R. Ogden, for the Blackburn Corporation. The house is on the ground floor, with large coal stores on each side under the same roof as the retort house, but separated from the working space by columns supporting the roof. There are 34 benches of retorts, making 340 mouthpieces; and the retorts are singles, not throughs. The mouthpieces are of the same section as the retorts, and are 20 in. by 15 in. ⏛. One drawing machine and one charging machine on each side

of the house works the whole of the retorts, with the exception of a bed at each end, which are too near the wall to allow the machines to work.

The coal is delivered to four coal breakers—two on each side of the house—by carts, and the coke is drawn out of the retorts directly into barrows placed in front of the drawing machine, and between it and the retort stack. A small steam engine is placed in a room built off one corner of the coal stores; and a line of shafting is fixed at right angles to the stack, with rope pulleys for driving the rope. The latter extends the whole length of the house without any support for the bottom or driving strand, except the machines, which may be anywhere between the two ends. At first the ropes used were made of extra plough-steel wire of a coarse gauge, and were found to be too coarse for the work; the bending stresses having much greater effect in damaging the rope than the frictional wear. After the experience of the first season's working, Mr. Ogden has tried a cotton rope, of about four times the sectional area, with very satisfactory results.

The most recent example of the wire rope system is that now working at the Beckton works of the Gas Light and Coke Company, where it is erected in the No. 12 retort house, in which there are 45 beds of 9 through retorts of a section 20 in. by 13 in. ⏀, or a total of 810 mouthpieces. The house is of the standard Beckton type, with stage floor and generator furnaces, the coal stores being at each side, and separated from the house by the roof columns only, the coal being brought in by an overhead railway on each side, and the coke falling from the retorts to the basement, from which it is removed in railway trucks. There are six charging and six drawing machines provided; two of each being kept as duplicates and in reserve in case of fogs, or any other exceptional demand for gas requiring four-hour charges to be put in to meet it. The engines for driving the ropes are fixed at one end of the retort house under the stokers' lobby; and two are provided, one being always out of action. Between the engines and on the same centers as the respective crank-shafts, there lies a length of shafting with clutches at each end by which either engine can be coupled up to the work. On this length of shafting are fixed the six pulleys for driving six sets of overhead countershafting by belts; and each set of countershafts, of which there are three on each side of the stack, drives its rope which communicates power to one pair of machines and stretches the whole length of the house with two intermediate supports or more, according to the position of the various machines. Each pair of machines—one drawing and one charging machine forming a pair—is kept quite separate and distinct from the remainder of the plant; and any pair can be left out of action or put into action at will, and either pair can work in any position on the one side of the house and draw any of the retorts. The coal is dealt with by four coal breakers (with elevators and hoppers) on each side of the house; and when loaded into wagons on the pier from the ship, it needs no further handling until the coke is loaded by shovel into the trucks, which remove it from the basement of the retort house. The loaded coal trucks pass over the coal breakers in the coal store, and deposit the coal onto the breaker; it is then elevated into the storage hoppers; passes from there into the charging machine; is delivered into the retort; and when carbonized the coke is drawn out and falls into the basement direct—no direct handling whatever being required. The ropes (of which there are six, one to each pair of machines and two always idle) are made of plough-steel wire of very fine gauge, and so constructed as to be exceedingly flexible; and they have given every satisfaction during the recent troubles, when a more damageable article might have caused anxiety to those who remember "how oft the sight of means to do ill deeds, makes ill deeds done."

I am unable to say definitely at the present moment what the actual saving in cost of power by the wire-rope method may be over the compressed air; but from diagrams taken from both kinds of engines, I can definitely say that the power required is reduced 40 per cent. when working heavier machines, and the wire-rope engine is also of a much more economical type than the air compressor. The drawing and charging machines used at Beckton are made off the same designs as those in use at Blackburn, all of which have been fully described in detail in the various journals devoted to the gas industry, rendering it unnecessary for me to take up your time by describing parts which can only be properly understood when seen on the actual machine. I wish, however, to point out that they are made much stronger than our former machines; for experience has taught us that for retort house work, where everything has to be kept going night and day, the ordinary engineers' rules are not adequate to the requirements, and it has been found necessary, in order to avoid any risk of mishaps or breakdowns, to make a large number of the parts of cast and Bessemer steel, and the bearings very long, and of gun metal in most cases. This, of course, makes the machinery more expensive in first cost; but it reduces the wear and tear to a minimum.

Supposing that a retort house was being designed for machine stoking, I should recommend for it 20 feet through retorts; that there should be a space of at least 21 feet 6 inches between the retort stack and wall or face of roof columns. For power machines at each end of the house there should be a space of 18 feet from the vertical center of the end retort to the face of the end wall of the retort house, to admit of the whole of the retorts being drawn and charged. For manual machines the space between the vertical center of the end retort and the face of the end wall of the retort house should be 11 ft. 9 in. The height of the roof should be sufficient to clear the top of the elevators. The height from the floor line to the top of the elevators measured at a distance of 11 feet from the face of the retort stack is 32 feet, at which height all roof principals and tie rods should be clear. This dimension is supposing the retorts are arranged in three tiers. If for four or five tiers of retorts, as the machines are sometimes arranged for, the height of the elevator must be increased proportionately according to the height of the top retort from the ground line. If the wire-rope system of driving the machines is adopted, I advise the engine for driving the rope gear to be fixed at one end of the retort house, and preferably in a line with the retort stack. This engine should be in a house outside the retort house if convenient. But the system of rope transmission is such that the driving engine may be fixed in any other convenient position. At the end of the retort house farthest from the driving engine, there should be room for the rope tension gear, which is fixed beyond the end of the house for a distance of 10 feet.

The sizes of the retorts best suited for either class of machinery have been dealt with in another portion of this paper; but I wish to point

Manual Machinery.

	Gas Made per Annum. Millions.	Gas Made per Ton.	Gas Sold per Ton.	Cost of Carbonizing, per 1,000 Cu. Ft.	Cost per Ton.	Estimated Cost of Old System at Present Time per 1,000 Feet.	Duration of Shift.	Remarks.
		Cu. Ft.	Cu. Ft.	d.	s. d.	d.		
Portsea.....	567	11,497	11,099	1.90	1 9.06	3.50	.....	Includes exhauster men.
Maidstone	200	11,083	10,619	1.50	1 4.50	3.50	12 hours.	——
Cheltenham ..	270	11,165	10,543	1.66	1 6.00	3.00	8 hours.	Since this return was made the cost has been reduced, when working on ten beds of eight retorts, to 1s. 4d. per ton.
Richmond. ...	180	10,934	10,358	1.80	1 9.80	4.50	8 hours.	Interest and wear and tear of machinery, 0.17d., making a total of 1.97d. per 1,000 cubic feet.
Reading.....	240	11,219	10,565	.....	.....	3.50	12 hours.	No return; but this being a modern house, the cost for labor must be low.

Note.—The above account for wages includes all charges (after the coals are tipped from the railway wagons into the stores) to the quenching and tipping of the coke into the yard; the above being results obtained from manual power machines.

out that they should be set in a perfectly straight line and parallel with the rails upon which the machinery travels. The floor of the bottom retort should not be less than 16 inches from the ground line. The retort mouthpiece lids require special attention, as they must be arranged to close back to allow the machines to pass. The distance from the face of the retort stack to the machines is 2 ft. 6 in., and the lids and fittings will be required to fully clear this, both when they are open and when they are closed. Again, the hinges should be made so that the lids are closed in the same direction as the travel of the machines when at work.

Where generator or regenerator furnaces are adopted, I have found with machinery great advantages when the producer feeding doors are directly below the retorts from which the coke is drawn. The feeding doors, as arranged at the St. Helens gas works, in connection with Mr. C. C. Carpenter's furnaces, are a good example in this respect. The openings are of fair size; and we can draw the coke direct into the producer without needing shoots.

Coming to the coal stores, I have before mentioned that it is immaterial where these are situated; but if the ground space is available there should be a coal store on both sides of the retort house. For medium-sized retort houses it is often an advantage to have a coal store on one side of the house only, as two coal breakers can be fixed in the store with elevators and conveyers to convey the coal across the stack. This arrangement has the advantage of enabling us to have the coal breakers, elevators and conveyers in duplicate; and the coal being concentrated in one store, the number of men required to feed the breakers is reduced.

The most economical method of designing a retort house of small or moderate size to be worked by a minimum number of men and machines is to have single retorts, say, 10 feet long, so that one coal breaker and elevator and one set of machines would only be necessary. A good example of the application of machinery to a small works is that designed by Mr. Valon, of the Westgate and Birchington Company, where the annual make is about 18 millions.

Although I have given you these dimensions as applying to the best house for machine stoking, it is by no means impossible to apply machines to retort houses where the working spaces available are much less than those named, and a number of instances can be pointed out where they are working 20-feet retorts with a space between the stack and wall of less than 20 feet; and if the retorts are of less length the space required can be reduced in proportion. Sometimes where space at the end of the retort house is unavailable, the machines are run out of the house at the ends; and with regard to the height of the elevators, these have often to be arranged to go between two roof principals and occasionally through the roof itself, or other modifications made to meet the circumstances.

At Folkestone, the first year after the introduction of my machinery, the make of gas was increased 969 cubic feet per ton of coal carbonized. I think I cannot do better than give you the opinion of this class of machinery, as found in Mr. May's (Richmond) Presidential address, last February, to the Southern District Association of Gas Engineers and Managers, as follows:

Before finally leaving the labor question there is an aspect of it to which I think it necessary to call attention—viz., the enhanced importance of labor-saving appliances where the rate to be paid for hand labor has become greatly advanced. In the history of the past one of the most direct effects of strikes in any large manufacturing industry has been to stimulate the invention of labor saving appliances, and to insure their more extensive adoption. When hand labor strikes we know neither the end nor the cost; but when a machine stops working, we, as a rule, know both the remedy and the expense of the repairs necessary to restore efficiency. May we not in our own domain of gas manufacture look forward to the increasing use of machinery, and to its more rapid perfection in the immediate future? Even at the present time it seems strange how comparatively few works have adopted the facilities for mechanical stoking which are in existence. At Richmond, West's manual power machinery has been employed for some years with excellent results; the wages for carbonizing, including all charges from the coal store to the coke yard, being about 1.80d. per 1,000 cubic feet. The interest and wear and tear of machinery come to 0.17d.; making a total of 1.97d. per 1,000 cubic feet. This, so far as I have been able to learn, shows a saving of 10d. per ton of coal carbonized as compared with hand labor. The increased make, through more expeditious working and even distribution of the charges, is well worthy of consideration; the sale of 16 candle gas per ton of half Newcastle and half Yorkshire coal at Richmond during the past two years averaging 10,300 cubic feet.

Most of the above machines work off five charges in 24 hours, the charges varying from 300 to 336 pounds per charge; so that the make per retort is very high—hence a considerable saving in plant.

Power Machinery.

At the Whitwood Chemical Carbonizing works, near Normanton, two pairs of my machines, driven by compressed air in a retort house containing 240 mouthpieces, carbonize from 1,200 to 1,300 tons of coal per week; each pair of machines drawing and charging 320 mouthpieces per day, at a cost of 1s. 1d. per ton, including all charges from the coal being delivered into the breakers to the tipping and quenching of the coke in the yard. At Belfast the cost per ton of coal carbonized by my compressed air machinery is about 1s. 2d. per ton. To the above must be added the interest on outlay, wear and tear, fuel, oil and waste, which amounts to from 2½d. to 3½d. per ton, according to the size of the works and quantity of coal carbonized.

Report of Counsel to the Massachusetts State Electric Lighting Association.

The first annual meeting of this Association was held at the Point of Pines, on July 16th, with good weather and an excellent attendance. Those present included Commissioner Barker, Geo. B. Neal, of Charlestown, A. W. Rogers, of Beverly, and C. C. Fay, of Lynn. The feature of the business sessions was the following "outline report," from Messrs. E. W. Burdette and W. W. Gooch, in respect to matters relating to electric interests that came before the State Legislature in 1890, that had been looked after by the above named gentlemen as counsel for the Association.

The electrical industries of Massachusetts were never so seriously threatened by legislation as at the beginning of the session of 1890. The pamphlet of extracts from the Journals of the Senate and House, which was sent to the members of the Association early in the session contained references to no less than 24 different bills, orders and petitions which had then been introduced directly affecting electric light companies. To these others were subsequently added. Included among them were numerously-signed petitions for the passage of a law to authorize cities and towns to establish and operate gas and electric light plants for both municipal and commercial purposes, and a special enabling bill in favor of the town of Wellesley; several propositions to curtail the powers and impair the authority of the Board of Gas and Electric Light Commissioners, and at least one direct proposal, urged with great vigor before the committee, to wholly abolish the Board and repeal the laws under which it operates; a bill to establish a State Board of Electrical Control, and another to create a commission to have the entire control and supervision of all electric light wires in the State; numerous orders looking to further municipal regulation of and control over the erection and maintenance of electric wires, and the protection of the public against accident to life and property from dangerous currents; a proposition to make owners of electric wires "responsible for all injuries to persons or property from said wires, which are not caused solely by the negligence of the party injured;" orders to require the marking or tagging of all wires, and the keeping of proper records of ownership for the benefit of the public; a bill to give special privileges to a new electric light company in a certain city of the Commonwealth, and another to override the decision of the Gas Commisioners in favor of the first established company in a certain town; an order to prohibit the use of electrical currents of high intensity; a bill to create a State inspector to measure the candle power of electric lights and test the accuracy of electric meters; and a bill requiring the sale at public auction of all future franchises to use the public streets with structures, wires or conduits, and limiting the term of years during which such franchises shall continue.

It is highly satisfactory to be able to report that out of all the matters above mentioned not a single piece of oppressive legislation was finally passed to be enacted. Bills for municipal ownership of gas and electric light plants (House Document, No. 573), and for the sale of street franchises at public auction (House Document, No. 513), passed the House, but were referred by the Senate to the next General Court. Indeed the only important measures which became law by reason of the extraordinary agitation of the subjects above mentioned were the bill to allow electric light companies to mortgage their franchises as well as their tangible property, and the bill requiring further and more effective municipal regulation and control of overhead and indoor electric wires, to the latter of which more extended reference is hereinafter made.

Without attempting, within the limits of this report, to explain in detail the origin, progress and results of the numerous measures which

were proposed and pressed, we will summarize results, and refer specially only to the more important.

Municipal Ownership.—This was pressed with great persistency before the Committee on Manufactures. Numerous petitions, extensively signed, were offered in aid of the proposed legislation. Numerous hearings were given by the committee. The closing argument in remonstrance was made by Mr. Burdette in behalf of the Association, copies of which, in pamphlet form, were subsequently mailed to the members of the Association. The committee evinced an earnest desire to have both sides of the question fully presented, and to arrive at the best conclusion in the interest of the people. They therefore obtained leave to visit the cities of Richmond, Va., and Philadelphia, Pa., which had been repeatedly cited by the advocates of municipal ownership as concrete illustrations of the success of their theories when reduced to practice. Upon their return the committee submitted an elaborate and able report (printed as Senate Document No. 191), adverse to the claims of the petitioners, and unanimously came to the conclusion that it wou'd be inadvisable to try the experiment of municipal lighting in Massachusetts. In view of the fact that the committee included members of both political parties, some of whom had and others of whom had not given the question prior consideration, the conclusion reached was particularly noteworthy.

The committee's report was accepted in the Senate, but, owing to peculiar reasons, which it is unnecessary to state in this report, a bill was substituted in the House. This bill, as amended and passed, was printed as House Document, No. 573, and, if carefully read, reveals the injustice and hardship which it would have entailed upon the electric lighting interests in the various cities and towns, if it had become a law. In its original form, it was identical in terms with that submitted to the committee by the "Nationalists," and contained no provision whatever for the purchase of existing plants by municipalities availing themselves of the provisions of the act. This omission was such an evident outrage on invested capital, that an amendment was adopted, which, if allowed to stand, would have in a measure protected private interests; but it was subsequently stricken out, and provisions inserted in the place thereof, which were really worse than none at all. The bill was in this shape when it was disposed of in the Senate by reference to the next General Court.

Before the matter was acted upon in the House, the opinion of the Supreme Judicial Court was obtained as to the constitutional right of the Legislature to pass laws enabling cities and towns to own and operate gas and electric plants. The Court's opinion was in the affirmative, but went no further than to announce the Legislature's constitutional right to pass a law, if it should deem it expedient to do so. This had not been denied by the remonstrants, who rested their objections solely upon the merits of the question.

Wire Regulation, etc.—The one important law hereinbefore referred to as having resulted this year from the unusual and unreasonable agitation of the wire problem, is Chapter 404 of the Acts of 1890, entitled "An Act relating to the regulation and supervision of wires over streets or buildings in cities." It is confined in its operation to the cities of the Commonwealth, but relates alike to electric light, telephone, telegraph, and all other kinds of wires Those companies, therefore, whose business is confined to the towns of the State where the wires have not become numerous, complicated or dangerous, are not affected by the law; while all companies doing business in cities are alike subject to its provisions. In the cities to which the law is applicable the results will, in our judgment, fully justify its passage. The removal of all "dead" wires, the thorough insulation and marking of all "live" wires, and the efficient municipal control and supervision of the whole system of wires in cities will ultimately be of great advantage to the companies themselves, as well as to the public at large. We therefore assisted in perfecting the provisions of this act, and favored its enactment as a law of the Commonwealth.

We were especially fortunate in the committee to which these electrical subjects were referred—the joint standing Committee on Mercantile Affairs. Composed of some of the ablest men of both branches, it brought to the consideration of the exacting and difficult problems presented to it for solution, rare good judgment and ready adaptability to new problems, as well as a sincere desire to accomplish as much as practicable in the public interest without entailing unnecessary or oppressive hardship or loss upon the private interests so vitally affected. This committee gave numerous public hearings, took a large amount of testimony, and sought the advice and listened to the arguments of everybody who could throw light upon the subject, including the representatives of the city of Boston and of the Citizens' Association, as well as private citizens and counsel for the various electric interests. The committee reported in print, in Senate Document No. 224, a volume of 250 pages. The demand for a general undergrounding of all electric wires throughout the State, though advanced, was not vigorously pressed at the session just closed. That subject was so thoroughly discussed before the Legislature of 1889 (see Senate Document of 1889, No. 292, containing all the evidence and arguments), that it seems to have been disposed of for the present. Had it not been for the action of the Boston Electric Light Company and the Edison Electric Illuminating Company of Boston, in employing counsel and opposing this measure on their own account in 1889, it would probably have given us much trouble at the present session.

Besides the numerous measures relating to the regulation and control of overhead wires, there were presented to the Committee on Mercantile Affairs numerous other important matters directly touching the interests of the electric light companies of the State. The limits of this report forbid any special reference to these matters, except the statement that they were considered and disposed of by the committee with the same patience, intelligence and uprightness of purpose as characterized their other acts.

Several companies have derived special and individual advantages by reason of their membership in the Association. One was saved from competition with a new company, which sought a special charter with special privileges, and another from the loss of all advantages derived from the action of the Gas Commissioners upon an appeal from the selectmen. One or two other companies, though not directly involved in the controversy, would have been affected in precisely the same way if the legislation sought had not been defeated.

The Relation of the Yield of Coke to the Composition of Coal.

Dr. Muck (Germany) asserts that the relation between the quantity of residue after calcination in an air-tight chamber—in other words, of the coke—and the proportional composition of the coal is simpler than the relation between the latter and the fusibility of the coal. Less complex also are the relations between the fusibility of the coal and the height of yield in coke.

The height of yield in coke is by no means proportional to the quantity of any single organic constituent (C, H, O + N) or to the sum of any two of them (some isolated cases excepted); it is, however, established by numerous experiments that it is affected far less by the amount of carbon contained than by the amount of hydrogen and oxygen (+ N), but especially by the amount of so-called *disposable* hydrogen.

A pregnant example of this is offered by two kinds of coal occurring together in vein 11 of the Hanover mine. These are glance coal or anthracite, and that variety of dull, slightly bituminous coal which occurs in conjunction with anthracite.

	C.	H.	O.
The bituminous coal contains	84.740	5.261	9.999
The anthracite coal contains.	82.988	5.301	11.701

The former yields 63.80 per cent. in coke and the latter 68.05 per cent. The bituminous coal with the greater content of carbon and the smaller content of hydrogen and oxygen, thus is seen to yield a smaller percentage of coke than the anthracite, which contains less carbon but more oxygen.

To 1,000 parts of carbon, however, the bituminous coal contains 47.33 parts of disposable and 14.75 of combined hydrogen, while the anthracite contains 46.23 disposable and 17.64 of combined hydrogen. The small difference of 1.10 parts of disposable and 2.89 of combined hydrogen per 1,000 of carbon, thus brings about the very significant difference, amounting almost to 5 per cent., in the yield of coke.

A somewhat similar difference in the yield of coke is shown by two coals from the Hannibal mine in Westphalia, which differ little in content of carbon, but one of which contains 3.27 parts of disposable hydrogen per 1,000 of carbon more, and only 0.9 parts of combined hydrogen less than the other.

The preponderating influence of the disposable hydrogen on the height of yield in coke is more or less apparent on all sides, nevertheless the yield of coke does not by any means always stand in the same relation to the amount of hydrogen per mille of carbon. When coals very rich in oxygen yield a very low percentage of carbon, this must be attributed to the fact that coals rich in oxygen are usually also very rich in hydrogen.

That the amount of residue from dry distillation depends principally on the content of hydrogen, and especially on that of the disposable hydrogen, is to be explained briefly as follows:

With the exception of a small remainder in the coke residue, the oxygen and hydrogen of the coal entirely disappear,

In the fabrication of illuminating gas the oxygen of the coal is found for the most part in the condenser as ammonia water, in the raw gas it is found CO^2 and CO, and finally in smaller quantity in the oxygenous constituents of the tars.

That amount of hydrogen which is not "burned" to water by the oxygen contained in the coal, disappears for the most part in condensable or non-condensable hydrocarbons, and is only present in smaller quantities in the hydrogenous acids and of the tars.

The free hydrogen contained in illuminating gas results from the decomposition of hydrocarbons in high temperature. Carbonic acid and water are only in very small quantity transformed, with the carbon of the glowing coke in the retort, into hydrocarbons and carbonic oxide, for the latter is not present in illuminating gas in large quantity. Since, however, it is demonstrable that the oxygen disappears only in part in the form of water, and only in the smallest quantity is combined with carbon and hydrogen, the remainder being combined with carbon into CO^2 and CO, there must then remain a considerable quantity of hydrogen free to form hydrocarbons. Apart from the consideration that alongside of CO^2, CO is also formed secondarily, it is clear that the disposable hydrogen is in position to carry away a much larger quantity of carbon than the oxygen, even if the latter took up only carbon, for: 1 atom (12 parts by weight) of C is changed to CO by 2 atoms (32 parts by weight) of oxygen, while 1 atom (12 parts by weight) of C is changed into CH^4 by 4 atoms (4 parts by weight) of hydrogen. Consequently, the disposable hydrogen is able to carry away an eight times larger quantity of carbon than the oxygen, and this even under the unfavorable condition that only CH^4, a hydrocarbon very poor in carbon, is formed. As a matter of fact, in the process of dry distillation along with CH^4 are formed many other volatile products far richer in carbon.

Remmert's Gas Washer.

On April 22, 1890, U. S. Letters Patent (No. 426,327) were granted to Mr. Herman J. Remmert, of Fort Wayne, Ind., for certain improvements in gas washers. The inventor says, in describing the apparatus, that the invention relates to a decarbonating washer and tar extractor to be used in connection with the manufacture and purification of coal gas, and its objects are, first, to provide means for successfully removing the carbonic acid and tar from the crude gas coming from the retorts prior to passing it to the scrubbers; second, to provide a continuous supply of decarbonizing fluid of uniform strength and constant liquid level whatever the gas pressure may be; third, to provide an extended and tortuous wetted surface for bringing the gas in contact with the liquid in order to facilitate the absorption of the carbonic acid and the breaking o the tar bubbles; fourth, to provide means for automatically varying the extent of said wetted surface in direct proportion to the pressure and quantity of entering gas to be treated; fifth, to provide a barrier between the accumulation of tar in the lower part of the apparatus and the main body of the purifying liquid; sixth, to provide ready means for removing said accumulations from the apparatus. In the accompanying drawings Fig. 1 is a vertical, central, longitudinal section through the apparatus. Fig. 2 is a vertical cross section of the same, showing the external

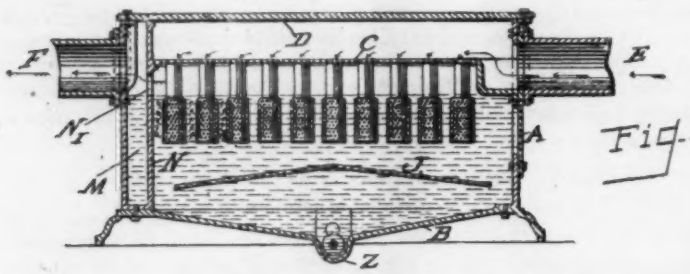


Fig. 1.

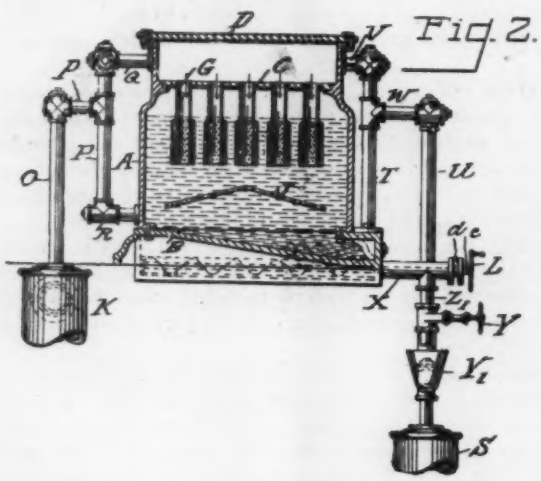


Fig. 2.

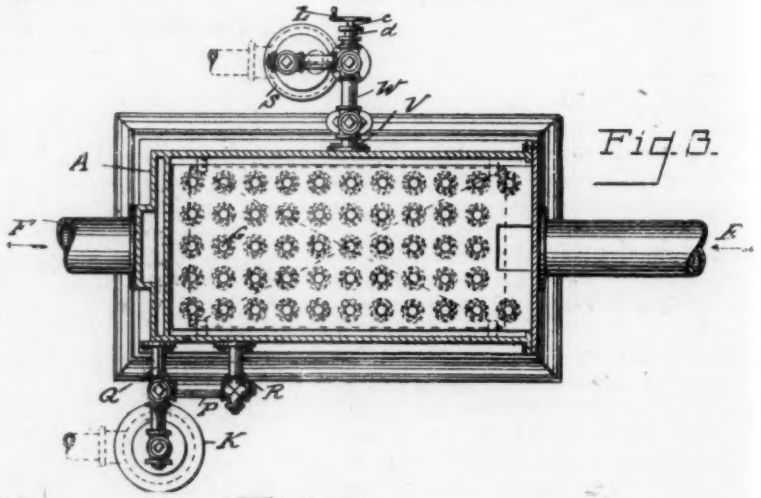


Fig. 3.

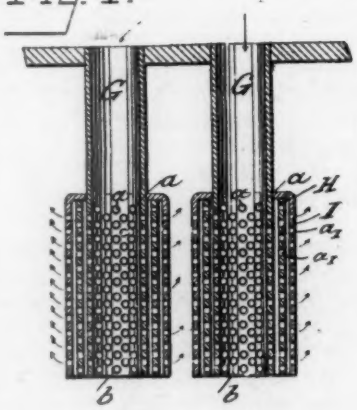


Fig. 4.

connecting devices intact; and Fig. 3 is a plan of the same. Fig. 4 is an enlarged detail view of a part of the same.

A is the outer shell of the apparatus, which is in the form of a closed box, the bottom, *B*, of which deepens toward the center. *C* is a partition plate arranged some distance below the top, *D*, of the box. *E* is the inlet pipe, which conducts the gas to the apparatus, and which may be located anywhere above the partition plate. *F* is the outlet pipe leading the purified gas to the scrubber or lime purifier.

The partition plate *C* is perforated with numerous openings, into which tubes *G* are fitted gas-tight. The lower portions of these tubes are provided with numerous openings *a*, of any desired form, and are open at the bottom *b*. Surrounding these tubes are other "jacket tubes," as *H I*, of which there may be any desired number, and the outer one of which is flanged over at the top, so as to seal each jacket tube at the top. These jacket tubes are also provided with perforations similar to those in pipes *G*, and all the perforations are located so as to "break joint" with those of the neighboring tubes.

J is a deflecting-plate, made convex on its upper surface, or double inclined and arranged below the tubes and extending to within a short distance of the walls of the box *A*.

K is a receiver, into which the strong ammoniacal liquor from the scrubber is delivered on its way to space *M* within the box *A* (partitioned off by means of a wall *N*, provided with an opening *N'*), by means of pipes *O*, *P* and *R*.

Q is a pipe leading from the upper end of pipe *P* into the gas space of the box *A*. Each pipe is provided at the elbows with one or more plugs, as shown, and by means of which the various connections may be regulated or broken and the pipes cleaned.

S is a receptacle for the liquor which has flowed from the box *A* through pipes *T*, *W* and *U*.

V is a pipe which enters the gas space of box *A* and connects with

pipe *T*. These pipes are also provided with plugs, permitting access for cleaning or disconnecting, as shown.

X is a pipe leading from the lowest portion or trough *Z* of the bottom *B*, and passes by means of a branch pipe *Z'*, provided with stop valve *Y*, to a tar cup *Y'*.

L is a crank handle, by means of which a rod *c*, which passes axially along pipe *X* through gland and stuffing box *d*, and which is provided with an endless screw located in the trough *Z*, is revolved.

It will be noticed that the opening *N'* and the pipe joints *P'* and *W* are all located in the plane of the liquid level, which is preserved constant in the apparatus, and that the connections *Q* and *V* are merely to act as gas connections to provide an equality of pressure on the liquid in *P* and in *T U*.

The operation of the device is as follows: Gas entering at *E* passes downward into the tubes *G*, which are immersed in a strong ammoniacal liquid to a point just above the uppermost perforations, and thence through the various perforations in the several tubes and their perforated jackets, and thus comes into intimate contact with said liquor, which absorbs the carbonic acid contained in the gas, and at the same time the globules of tar in the gas come into contact with the several tubes and drop to the plate *J*, whence they pass to and accumulate in the trough *Z*. No matter what the pressure of gas may be the liquid level will be maintained constantly, owing to the action of the pressure equalizing pipes, and consequently the greater the pressure of the gas the deeper it will penetrate the tubes, and the liquor and the gas will be cleaned to a uniform degree, notwithstanding the greater flow. As the gas emerges from the outer tube jacket and the liquor it will spray the liquid against the upper portions of the tubes, and thus constitute them a further wetted surface for the absorption of the carbonic acid and for the breaking of tarry bubbles. The gas then passes through opening *N'* into the outlet pipe *F* and toward the scrubbers. A constant circulation of the liquor is maintained, and the greater the gas pressure the more rapid will be the circulation, thus keeping the liquor in a strong active condition at all times and in quantity proportional to the work required of it.

By revolving crank handle *L* and opening valve *Y* the accumulated tar is led off. The deflector *J* serves to prevent a constant stirring up of the tarry accumulation by the action of the gas and the flow of liquor, and confines the heavier liquors to the lower part of the vessel. By making use of the various cocks the rate of circulation of the liquor may be varied.

By freeing the gas of its tarry matters and of its carbonic acid the amount of service which would be otherwise required of the scrubbers will be diminished, and consequently they will not need to be refilled and cleaned so frequently.

Parsons' Steam Generator.

On June 10th U. S. Letters Patent (No. 429,771) were granted to Mr. Francis W. Parsons, of Philadelphia, for improvements in steam generators. In his specification the patentee says:

This invention has for its object the utilization of heat generated in the manufacture of gas from coal for the purpose of generating steam to be used for power or heating purposes, and to provide an arrangement of retorts, boilers, and connections whereby the heat generated under the retorts is conducted by a suitable system of piping into or in contact with suitably arranged and located boilers, which boilers are provided with a system of steam distributing pipes.

Referring to the drawings, Fig. 1 is a front elevation of a series of gas retorts and boilers, and systems of heat and steam pipes for connecting the same. Fig. 2 is a longitudinal section of the preferred form of boiler, and Fig. 3 is a plan of a modification of a system of heat conducting pipes. Fig. 4 is a vertical section on the line *x x* of Fig. 2, showing the details of connection of the heat conducting pipes between the benches and the boilers.

Similar letters of reference indicate like parts in all the figures of the drawings.

A represents a series of gas retorts, which are of the usual construction and provided with the usual gas conducting pipes A^1, leading to the main pipe A^2, by which the gas generated is led to the desired points for consumption.

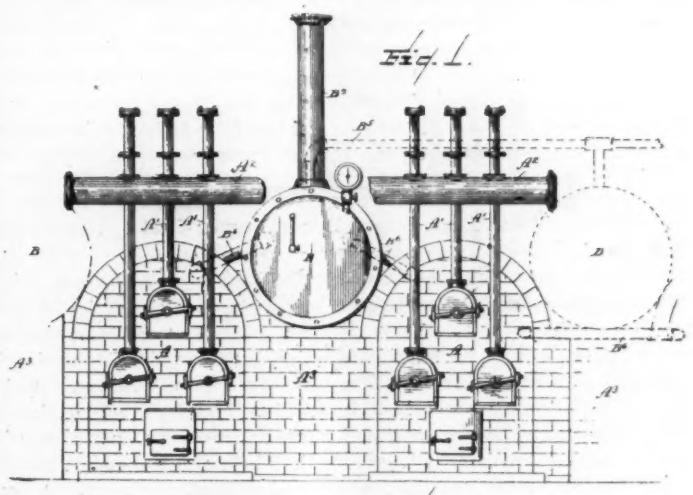
B represents a series of, in this instance, tubular boilers, which are mounted between the retorts *A* upon any suitable foundation or support A^3.

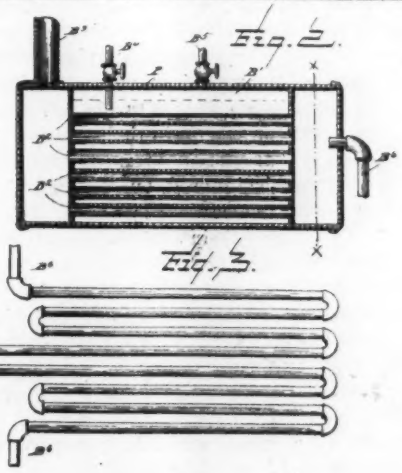
If desired, any other form of boiler desired may be substituted for the ones herein shown, in which case the means for transmitting heat to the boiler is changed to coincide therewith, as will be hereinafter described.

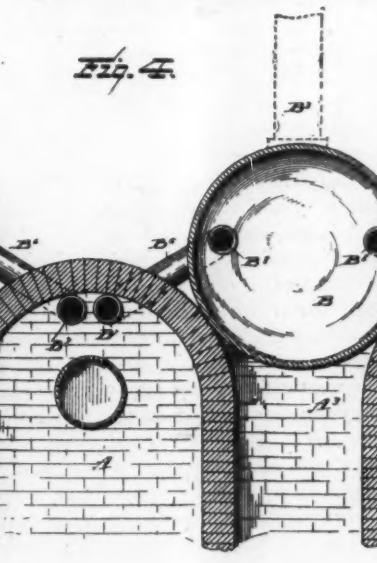
Within the boiler *B* is formed the water space B^1, through which pass the fire tubes B^2, which communicate with and lead to the uptake B^3, mounted upon the rear end of the boiler.

B^4 represents the water supply pipe, which leads to the boiler from any suitable source of supply, and B^5 represents the steam conducting pipe.

Leading from the benches *A*, and connected thereto at B^7, are heat conducting pipes B^6, by which the heat generated in the benches and







the products of combustion are led into the boiler *B* B^6 through the fire tubes thereof and out the uptake B^3. The steam generated in the boilers *B* by the heat and products of combustion thus conducted is carried by the pipe B^5 to any suitable system of piping, and may be used for either power or heating purposes. By such an arrangement the heat generated in the retort benches and usually wasted is utilized to make steam, and the same plant that furnishes gas to a community can also furnish power or heat.

Having described my invention and its operation, what I claim is—

1. The combination, with the retort benches A, having the intermediate masonry A^2, and gas conducting pipes A^1 A^2, of the boilers B, connected with the retort benches by pipes B^6 for conducting the heat products of combustion from the benches through the boilers, and the steam conducting pipes B^5, arranged for joint operation, substantially as described.

2. The combination, with the series of retorts having gas conducting pipes A^1 A^2 and intermediate masonry A^2, of the series of boilers mounted on said masonry between the retorts, and having water space B^1 and tube B^2, the supply pipe B^4, leading to the water space, the steam conducting pipes B^5 from the boilers, the uptakes B^3 from the boilers, and the heat conducting pipes B^6 connecting the upper portions of the retorts with the boilers to conduct the products of combustion and heat generated from the retorts through the flues of the boilers, substantially as and for the purposes specified.

What Does Steam Horse Power Cost?

By Mr. Thomas Pray, C.E.

We have some curious instances of steam plants in the various "electric" enterprises now in existence, high speed, high terminal pressure, and a vibration of all the real estate within 1,000 feet, that is amusing if not comforting, and a rarity of dividends equal to some railroad stocks you are not unfamiliar with in Philadelphia. The high speed engine is all right in its proper place and under proper conditions, and no man in the United States is more to blame for their introduction and use than myself, having been intimately connected with them since 1870, not, however, in the abuses of them in ill adaptation so practiced in the electrical misabuses; but men who put up steam plants from which to make money need as much as four weeks' experience to plan them and adapt them, and should have another week or two in which to learn that familiarity born of experience for success in the operation of such plants.

Builders of engines sometimes study results, and sometimes do not do so. Cause and effect may be ignored, but the result is as sure as death.

Experience is somewhat a necessity in using steam, and a man or firms who cannot profit by some of their experiences are to be pitied more than blamed. A steam plant should be laid out to do a certain thing, and all means used to accomplish the objective point.

Preference and prejudices are exceedingly unreliable factors to introduce, but are commonly present. We must study the facts, profit by failures, and be guided by the successes as well. No lack of excellent engines, boilers and accessories in this country to-day. We can make a horse power cheap if only the natural laws are observed, not discarded; facts by comparison are valuable, and I shall now proceed to go over the most intimately connected facts with the cost of the I. H. P., as well as some of the reasons why such an extravagant amount of cost follows the misuses or abuses of our servant, steam power.

Heat is the source of all life, all motion in life; and inaction is cold, lack of heat or death in a physical sense. The laws of heat, its production and transfer, are very few and simple, and like all the material substances God has given us for our use and benefit, His and their laws are easy to understand, being simple in the extreme, and the failures of mankind are generally and very directly traceable to an attempt to discard some of the laws so plain and simple.

We know that it requires a certain and specified heat to melt ice, to boil water, and we also know that after water is boiled and confined that if we add a certain number of heat units to the vapor of water that we have steam under a pressure higher or lower, and that we can and do have a temperature due to pressure. We also know that when we have made our steam, we cannot use it in any way without constant loss, for we can add as many increments of heat as the boiler will stand pressure, but the instant we set it in motion for any purpose whatever, then we lose portions of the heat, and steam begins its return to its original state of water. We also know that if we observe certain laws, we can use the medium of steam with only a small loss of heat, and the smaller the loss, naturally the higher efficiency we attain; these facts are recorded in Regnault's researches. Rankine has expounded the practical application of law and constants as no man before or since, and many others have aided in researches to verify these laws; notably Prof. Rowland, of Johns Hopkins University, who more than any other American has investigated, only to prove that Regnault and Rankine have done their work in accordance with the utmost refinement physically, and the deductions are mathematically correct, and practically applicable and reliable; a host of other names could be mentioned. The library of the Franklin Institute is full of them, I presume, volume after volume, and these researches have extended over 62 years, or from 1827, when Sadie Carnot opened up the mine which has so far proved inexhaustible.

Any man can learn this if he will. It is not secret, occult or mysterious, and the man who can make a horse power cheaply, is not often in search of a job. "There is plenty of room up-stairs" in steam or any other of the professions.

The compounding craze is now in fashion, and my time will not permit much to be said of it. It is a new application of an old idea, and like the measles must have its run. Steam can be expanded, *too*, many times, and expansion can be so expanded in practical work, that it costs more than the simple compound. It is only another of the ideas, and will ultimately drop out of its present rush, and the happy medium be found.

The compound engine, as triple or quadruple expansion, is a cumbersome affair, parts are multiplied, and true, a higher *rate* of expansion obtained, but if we come back to Carnot's law and Rankine's efficiency, the many-headed compound engines now in use have an efficiency of from 42 per cent. up to rarely over 60 per cent., when steam pressure, volume, ratio and expansions are all considered. I do not mean 42 to 60 per cent. of the *theoretical*, but 42 to 60 per cent. of the *practical* result that such an engine should give from the high pressure carried, and the volume, and expansion ratios of the cylinders.

Some curious instances of these engines have come into my hands, not all marine engines by any means, and some of the very largest steamers afloat to-day have been all investigated, changes made so far as was permissible, and yet we find the speed of steam in ports, 18,000 feet for steam of 40 pounds gauge pressure, and 13,000 feet for 6 to 10 pounds of gauge pressure, and when Rankine's rules are applied we find 12 to 15 per cent. loss in 18 to 24 in mean, and 25 to 40 in the low pressure cylinder, and in many cases now afloat a properly constructed simple compound with a high and two low-pressure cylinders, with speed of steam proportioned to the piston speed would exceed in efficiency any compound triple expansion engine afloat to-day. It is not an unusual thing to use 24 to 27 pounds of steam per horse power per hour to-day on those so-called improved engines—the loss of initial pressure is from 10 to 40 pounds; clearances are *enormous*, yet they are in fashion.

The compound engine, non-condensing, is also being tried, and is an amusing instance, and an expensive one as well, being the compound locomotive. Of course, the stockholders do not complain when the "Luxury" is put in the round house for repairs, and years roll on without improvement. The world would retrograde you may say, but when so-called improvements are built upon violation of physical laws so well known as the properties of steam, and then the real results so carefully concealed, we may judge with propriety, that success did not attend the results, or to call it properly, we say failure did attend.

Making money is a pretty good profession, and a man to make money in the use of steam power has a great many things to learn, many claims of saving 20 to 50 or some other per cent., which are perhaps honestly stated, but which are preposterous when put to actual test. A man may save 20 per cent. of the bulk of steam, and not 2 per cent. of heat units. He may waste one-third of his steam and yet do his work by another engine and waste 40 per cent., and do his work with one-half the coal he did in wasting one-third of the steam. He can add his back pressure so that his engines become a reducing valve, and so save it all. But by changing engines he can easily do the same horse power with one-third the steam, and boil two times as much soap, or oil dye vats, sugar or other articles of manufacture, actually doing three times the work with the same coal as was done before.

This will be shown you on the screen, and not a single figure will be given from any source except my own work, and in each the result will be put down in dollars and cents.

What Does a Steam Horse Power Cost?—No. 1. One pound lifted one foot high, or one pound of force acting through one foot of distance, equals one foot-pound or one unit of work. Thirty-three thousand foot-pounds, or units of work, lifted one foot high in one minute of time, equals one horse power.

Indicated horse power means power exerted after sweeping out the exhaust. Net or effective horse power is the dynamo-meter measurement from a belt or shaft, and represents the power of engine to do useful work outside the engine itself.

Five hundred and fifty foot-pounds per second $\times$ 60 = 1 horse power or 33,000 pounds. Pounds of pressure or the piston surface in square inches of area, multiplied by the number of feet the piston travels per minute, divided by 33,000, gives the indicated horse power; or force $\times$ by space to which force is applied $\times$ by distance in feet per minute $\div$ 33,000 = horse power for the stated or observed conditions only, and for that moment.

Unreliable data: "Multiply cylinder diameter in inches by stroke in inches and divide by 4;" "multiply the mean effective pressure in pounds per square inch by double the piston speed in feet and by the square of diameter of piston in inches, point off five places from the right;" "call the mean pressure 40 pounds;" "the cube root of the stroke in feet multiplied by the square of diameter of cylinder in inches and divided by 60;" "multiply the cube root of stroke in feet by square of diameter of piston and divide by 20;" "multiply velocity of piston in feet per minute by the diameter in inches squared and divide by 6,000."

Still, No. 1 is briefly stated in the first four paragraphs, the basis of which makes a horse power. Force and time, or force, time, and distance, are the whole number of elements. We say a pound, a foot, a minute, and a pound lifted a foot equals a unit of work, and 33,000 pounds a foot high in a minute equals James Watt's unit of a horse pulling his load, the equivalent of 33,000 in one minute, or one horse power: and if we apply our inquiries to the piston head, we have the area of the piston to replace the horse cart, the steam to substitute for the pull of the horse, and the speed of piston backward and forward in feet per minute in place of the walking of the horse. So we must multiply the square inches of the piston's area by the actual mean exerted pressure of steam on the area in pounds, and that by the number of feet per minute, then divide this product by 33,000 pounds, and the result equals the horse power for that stated train of conditions and instant only.

We may estimate the pressure, but to gather the facts the indicator must be used, and correctly. The last paragraph of No. 1 shows some *exceedingly* "unreliable data."

Take the first so called rule, 12 inches diameter, 24 inches stroke, then $12 \times 24 = 288 \div 4 = 72$ horse power. Now take same problem with a longer stroke, $12 \times 36 = 432 \div 4 = 108$ horse power, showing its absurdity on its face, no speed, no mean pressure, no correctness in its result. The next two are unworthy your attention, except to show that such so-called rules exist. The last two show old and now obsolete rules for nominal horse power—no use in modern practice.

Steam in Sewers and Drains.

Mr. A. H. Napier, in a recent issue of *Building*, says that while the Board of Health and our New York city authorities are very properly insisting that steam heating companies shall not endanger the health and comfort of our citizens and ruin the public sewers and other underground conduits by leaks from their mains, it is but just to the various interests involved to again call attention to a similar nuisance that has existed in a less degree for many years. We refer to the discharge into house drains and sewers of steam, or water at the boiling point, from the exhausts, returns, drips, blow-offs, etc., of the private power and heating plants in all parts of the city. All who have had to do with the public sewers are familiar with the fact that, long before the present steam heating company began operations, these sewers were being injured in many places, especially in the down-town district, by escaping steam. The employees of the Department of Public Works are said to have long found it impossible to enter or work in these sewers during certain hours, because of the high temperature. The Board of Health established the rule, for buildings erected since 1881, that no such steam connections should be made "with the sewer, or with any house drain, soil pipe or waste pipe. Such pipes must discharge into a *tank* or *condenser*, from which a suitable outlet to the house sewer [outside the main trap] may be provided." A city ordinance also required similar "condensers," and prohibited direct sewer connections. Despite these regulations, however, or rather because of their non-enforcement, such connections were frequently made and with the results noted.

In old work, returns, drips, air valve and steam trap wastes were often tapped into the nearest waste pipe or drain. Inefficient exhaust heads discharged into soil pipes and leaders on the roof, and the exhaust from small engines, etc., for special purposes, when placed on upper floors, discharged directly into the plumbing system. As a result of this heating of the pipes the lead jointing was forced from the hubs by continued expansion and contraction, and the joints opened for the escape of "sewer air" into the building, while at the same time the public sewer was heated by the escaping vapor. We have personally seen such defects in an aggravated form in some of the public buildings, court houses, hospitals and schools, as well as in the business buildings of this city. No class of defects is more common or familiar to those engaged in making such examinations, and we doubt that scarcely an order is issued by the Health Department against buildings having steam plants which does not contain a clause requiring the disconnection of some such steam pipe from the house drainage system. We have often noticed steam escaping from the fresh-air inlet grates in the sidewalk in front of down-town buildings; one such case, in particular, on lower Broadway, seeming to indicate the connection of an exhaust with the house drain. It is also a fact that the exhaust of a small engine was, recently at least, connected directly with the untrapped drain of a large building which is situated at one of the points mentioned by the Board of Health in their order to the steam company.

In new buildings the Health Department regulation is now enforced, but as this is for the protection of the plumbing system merely, little more is required than that any such steam connection shall be made on the sewer side of the house-trap. The absence of the "tank or condenser," mentioned in the rule, is not generally noted or criticised, the requirement presumably being left to another department to enforce. As a result it is often not provided at all. Again, in many cases the *letter* of the regulation is complied with, while the "tank" provided is so poor a "condenser" that it is worthless so far as keeping the sewers free from vapor is concerned. The practical results of such arrangements may be seen at many of the sewer man-holes. Here the intermittent escape of steam, or its regular discharge at certain hours each day, would seem to indicate connections from the pipes of adjoining buildings, rather than leakages from street mains, which are under a constant pressure.

In new buildings the present official inspection will prevent the more objectionable connections with the house plumbing. Architects and owners, however, will do well to require all necessary condensers, etc. A steam heating contractor recently said: "Yes, I will provide the tank required if my competitors are instructed to do the same, as I know that some will not figure on it, and so their estimates will be lower than mine."

In the majority of the older buildings radical reforms are still necessary in this direction. Their owners, therefore, while aiding as good citizens in the suppression of the "steam heating nuisance," should first be sure that they are not contributing their share towards increasing, if not actually causing, the trouble complained of.

We do not wish to be understood as underrating the importance or danger of serious leakages from the street steam mains. The other defects which we have noted, however, seem equally important, since they produce very similar and objectionable results, and these will continue whether the mains in question are repaired or removed. Indeed the special evils described might very possibly be increased with a greater number of small steam plants in place of a single one of large size. It, therefore, seems timely to urge upon the proper authorities the wisdom of a more careful and thorough enforcement of the regulations quoted. If necessary, a house to house inspection should be made of buildings using steam, to insure that the ignorance or cupidity of a multitude of owners does not result in as serious a menace to the public health as the acts of a single company.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. Burdett Loomis, of Hartford, Conn., is to read a paper, on "The Use of Water Gas in the United States," at the October meeting of the Iron and Steel Institute.

We understand that Messrs Joseph P. Capen, W. C. Stewart and others have incorporated the Burrell (Pa.) Gas, Water and Improvement Company. This place is a post township of Westmoreland county, Pa., and is located on the Allegheny river at a point about 15 miles northeast of Pittsburgh. It holds within its limits a thriving settlement called Parnassus.

The Board of Trustees of Oneonta, N. Y., have renewed a contract for the public lighting of that village with the New York and New Jersey Globe Gas Light Company.

The electric lighting plant operated by the Thomson-Houston Company, at Ware, Mass., was recently destroyed by fire. But little was saved outside the boiler house. The loss, which is placed at $9,500, was fully covered by insurance. The interruption of the lighting service caused much inconvenience.

At a session of the Kingston (N. Y.) Common Council, specially called to consider the matter of an award for public lighting, the following bids were opened: Rondout and Kingston Gas Light Company, 195 or more lamps, including repairs, to be lighted each night and all nights of the year, $14.50 per lamp; Kingston Electric Light Company, 31 arcs (2,000-candle power), $100 per lamp, and 400 or more incandescents (16-candle power), at $15 per lamp; N. Y. and N. J. Globe Gas

Light Company, all lamps now lighted by it at $19 per lamp; Columbus Lantern Works, 200 lamps, more or less, at $18 per lamp, under a three-year contract, or $18.50 per lamp under a one-year contract. When the bids had been read, Ald. Hayes moved that the contract for lighting the lamps in the city proper be awarded to the Gas Company at its offer of $14.50, and that the lamps in the suburbs be awarded to the Electric Company on the basis of its $15 proposition. Ald. Dedrick asked Mr. Roosa (who represented the Gas Company) whether the latter would only take the 195 lamps now in use, or the 400 odd lamps that made up the total in city and suburbs. Mr. Roosa replied that the Company would place lights wherever its mains were. This elicited the remark from Ald. Dedrick that the electric lighting proposition, inasmuch as it contemplated the entire lighting of the city, was to be preferred to the Gas Company's proposition, although the latter was 50 cents per lamp per annum lower, unless the Gas Company extended its mains so as to enable it to perform all the work required. He then amended the Hayes motion so as to make the latter read that the entire lighting be awarded the Gas Company, the latter to employ gas lamps wherever its mains could be tapped, other situations to be lighted by oil lamps similar to those now in use. After some more by-play of words the amended motion was adopted, and the Corporation Counsel was directed to draft a properly specified contract, and the same to be approved by Mayor Kraft.

ABOUT a fortnight ago Manager Murphy, of the Grand Forks (N. D.) Gas and Electric Light Company, concluded negotiations by which he and his associates came into possession of the water power and the water gas and electric light plants of Crookston, Minn. We understand that the money amount involved was $175,000. Mr. Murphy assumes the Presidency of the Crookston enterprise, while Mr. George B. Clifford, of Grand Forks, will act as Treasurer.

A SAN FRANCISCO correspondent, writing under date of July 23, incloses the following cutting from a local newspaper: "There is trouble ahead for local hotel men and the good lesson they may learn from it will be to read the daily papers more closely. Ever since gas was substituted for candles all lodging-house keepers have had more or less tribulation therefrom, and more trouble is now approaching. Recently there have occurred here several cases of gas asphyxiation, which are noted periodically in all large cities. Supervisor Ellert saw, or thought he saw, in such casualties a clear case of cause and effect, and he promptly introduced and passed through the Board of Supervisors an ordinance designed to remedy the difficulty by prevention. It was ordinance 2,226, and is known generally as Ellert's gas fixture order. It was adopted June 9th but when its provisions will be carried out is the conundrum that both hotel men and Supervisors may be excused from guessing. Briefly, the ordinance provides that every hotel or lodging-house keeper, having 12 rooms or more for public use, shall have the pipes and gas fixtures of his place tested by a competent gas fitter, and shall file a report of such inspection, with the Public Gas Inspector, every 90 days. The penalty for non-compliance with the order is a fine, or 50 days imprisonment, or both. On July 1st this went into effect, and as a beginning it was also decreed by the municipality that the first of the reports should be filed by July 10th. Not a report from the 500 or more lodging-house and hotel men, that the order should affect, was then filed with Gas Inspector John Q. Brown, nor has there been any yet filed. The special provision, requiring the first reports by the 10th inst., was duly advertised for four successive days prior to that date, so if the hotelkeepers have read the papers as they should there is no excuse for their dereliction. Few citizens know the precise locality of Inspector Brown's sky-parlor up in the attic story of the old City Hall. Exactly why he should be alloted out-of-the-way quarters is not clear, but, still, ignorance of the location of the Inspector's office is hardly a valid excuse for the non-appearance of the gas fixture reports. The chances are that Mr. Brown will have to set the local Bonifaces thinking by making a few arrests, for the Gas Inspector is charged with having this law carried out. It will 'pain' the Inspector to put Mr. Thorn, of the Palace, or Major Hooper, or Mr. Claffey or Mr. Seymour in jail, but the law must be obeyed."

A MEMPHIS (Tenn.) correspondent, writing under date of July 25th, says: "I note in your financial column for July 21st that you are of the opinion that no consolidation is likely to take place, for the present at least, between the conflicting gas interests of this city, and I must say that I agree with you—in any event, certainly not until the proprietors of the Equitable Gas Company can be made to understand that they are far from being in a position to dictate the terms of the bargain that must come sooner or later. I inclose you the following, respecting the proposition for a compromise that was rejected by the Directors and shareholders of the Memphis Gas Light Company." The inclosure, which is from the Memphis *Scimetar*, of July 10th, is appended: "The Memphis Gas Light Company will not consolidate with the Equitable Gas Light Company. This is in reply to an article in the local columns of the *Appeal* this morning saying there would be a joint session of the Directors of each Company to-day. There was no joint session of the Directors, nor will there be any. A meeting of the shareholders of the Memphis Gas Light Company was held to-day, and it was largely attended. The object was to consider a proposal made by a committee of the two Gas Companies looking to a sale of the Memphis Gas Company to the Equitable Company. The charter of the latter does not prohibit a purchase of another Company, and the charter of the other does not prohibit a sale. 'Opposition,' says a circular to the Gas Company's stockholders, 'between gas companies in the same territory is always at double the expense, and most frequently disastrous to the companies and hurtful to their patrons. The proposed plan, as a basis of joining the interest of the two companies, is as follows:

Bonded debt, bonds 5 per cent		$1,250,000
Capitalization, stock		1,500,000
Bonds.		
Reserve in trust to meet Memphis Company's present debt		240,000
Issue to Equitable Company to equalize this		240,000
Issue to Memphis Company stockholders, 50 per cent. in bonds	$375,000	
Issue to Equitable Company stockholders, 25 per cent. in bonds	187,500	
		562,500
Retain in treasury for improvements and extensions		207,500
Total bonded debt		$1,250,000
Stock.		
Memphis Company, 100 per cent. in stock	$750,000	
Equitable Company, 100 per cent. in stock	750,000	
Total stock		1,500,000
Result.		
Memphis Company, $375,000 bonds, market value		375,000
Memphis Company, $750,000 stock, market value, 50 cents		375,000
Total market value		$750,000

"The matter, however, is unfavorably regarded by the shareholders of the Memphis Gas Company, as the terms of the proposed sale look like a sacrifice of a large portion of their property, and which they are not willing to consent to. The Companies are not making any profits, nor can they under existing circumstances, and sooner or later there will not be two companies; but there will be no absorption of one by the other under the above-quoted proposals. The Memphis Gas Company has been operating here for nearly 35 years. Until three years ago it paid dividends semi-annually, and the average earnings were between 8 and 9 per cent. This statement is made by one of the shareholders who has owned 40 shares for 15 years past. The earnings on his investment he states were satisfactory until three years ago, since which he has enjoyed no earnings at all, on account of the Equitable Company having entered the field in competition. All of the stockholders (175 in number) are just in the same boat. They have had no dividends for years, and for an indefinite period are not likely to have. The stock of the Memphis Gas Company in 1886 and '87 was worth par and a fraction in open market, but since then values have greatly declined. Three years ago it went down to 75 cents on the dollar, and now it is down to about 42. Its stockholders are largely residents here, but nearly half of its $750,000 capital is owned by investors in Nashville, Pittsburg and elsewhere. Some live as far as Walla Walla, and many widows and orphans are on the list. The temper of a large majority of the owners is against selling out unless more favorable terms are offered than those that have been hitherto submitted. The Equitable Gas Company entered the field here in 1886 or 1887 and has been in full operation two years or more. It has kept the old Company from making any profits, but it has not been enriched by this plan of working. Only about 2,000 meters are in use in the city, and one-half of these would be ample. Of course, the Equitable came here to make money, and it will do so before the end, because if it buys out its competitor the capital will be increased and a basis arranged whereby the net earnings will pay fair returns on the same. But this is not likely to be accomplished at the present time. It may be done later but not now. Meantime the consumer of gas may

have new chandeliers put in without expense to himself and he can go on using lights at low prices, while the two Companies continue to play the game of freeze-out. The public will not suffer as long as the combat goes on. What may happen in the future no man knows."

THE lesson that has been taught the consumers and suppliers of natural gas in the Pittsburgh district does not seem to have any terrors for the contemporaries of these in the Indiana district. Waste, and wilful waste, is the order there.

PROPOSALS recently submitted for the public lighting of San Francisco are as follows: San Francisco Gas Light Company, 12 cents per lamp per night. California Electric Light Company: For 16,000-candle power mast lights, each, per night, $4.40; for 2,000-candle power mast lights, each, per night, 55 cents. The bids were referred to the street lighting committee.

MR. WILLIAM TRACY, Secretary and Superintendent of the Alton (Ills.) Gas and Electric Light Company, writes as follows:

ALTON, ILLS., July 24, 1890.

To the Editor AMERICAN GAS LIGHT JOURNAL: A piece of information that may be useful to many Superintendents (I became acquainted with it one year ago) is how to have ice water the year round without paying the ice dealers one cent. I draw my city water through a ¾ inch pipe and carry same to gasholder tank, drop a coil to bottom, or nearly so, bringing a riser to top, fitted with faucet, and draw cold water the year round. A trial will convince any Superintendent that there is no necessity for an ice bill at any gas works.

ACCORDING to a local authority an important meeting of the Directors of the Springfield (Mass.) Gas Light Company was held on July 21st for the special consideration of the steam heating branch of the Company's business. It appeared from a report of Superintendent Fowler that this department was not self-sustaining, and it was therefore unanimously resolved to increase the rates charged for heating as follows: On 1-inch meters, from 77 cents to $1 per 1,000 units; on 1¼-inch meters, from $2.20 to $3.25; on 2-inch meters, from $5.50 to $7.50. All contracts are also to be readjusted. It is proposed to notify all the consumers of steam, individually, of the advance in rates, so that there may be no misunderstandings; and the Company will ask to be informed, in turn, of the intentions of its customers regarding the continuance of the service for the coming season. It has for some time been the impression of those interested in the Gas Company that the steam heating was not a very profitable branch of the business, and Mr. Fowler's predecessors in the Superintendency—the late Geo. F. Dwight and J. L. Hallett—were not a little perplexed by the problems in management which it presented. Recently a thorough investigation of the subject has been made, in which the well-known expert on heating and ventilation, Mr. J. H. Mills, of Boston, assisted, resulting in a clear demonstration that, at the rates hitherto charged, the business has been conducted at a dead loss to the Company. It is significant that in every other New England city where the heating of scattered buildings from a central station has been tried, save Boston, it has sooner or later been given up as a failure. In Boston the attempt is not now made to heat buildings widely separated, and in both New York and Boston the rates charged, according to Mr. Mills, are considerably more than the new rates proposed for Springfield, although the cost of coal is less. Auburn, N. Y., is the only city from which anything like favorable reports of the business have been obtained. The entire cost to the Gas Company of the steam heating plant, including the distributing mains, has been over $115,000, but over $30,000 of this has been wiped out by depreciation, so that the present value of the plant is placed at $85,000. As the dividends to stockholders must, of course, be regularly paid, the consumers of gas are interested in having the heating business pay for itself or be abandoned.

THE East Newark (N. J.) Gas Light Company will extend its main service in Bergen, Kearney and Grant avenues, and in Cammeyer and Halstead streets.

THE troubles and disasters that recently disabled the Cape Island (N. J.) Gas Company have caused much inconvenience to the summer dwellers of Cape May city.

IT is reported that the American Gas Investment Company is about to make proposals for the purchase of the Pittsburgh and Allegheny City (Pa.) Gas Companies. The capital stock of the former is $1,300,000; of the latter, $1,000,000.

THE house-to-house inspection of the gas fixtures in use in consumer's residences at Paterson, N. J., is to be undertaken and carried through by the proprietors of the local gas supply. The consumers will be at no expense whatever.

WE understand that the suppliers of natural gas for heating in Toledo, Ohio, propose to charge 10 cents per 1,000, the consumption to be determined in the ordinary way through meters.

THE retail gas stove business in New York is assuming large proportions.

AT the annual meeting of the stockholders in the Woburn (Mass.) Gas Company, the following Board of Directors was elected: Benjamin Hinckley, John Johnson, G. R. Gage, Richard J. Monks and Chas. A. Jones. The year's business was very satisfactory.

THE new issue of stock (354 shares) in the Gloucester (Mass.) Gas Light Company was offered at auction, on the morning of July 26th. Mr. Geo. R. Bradford started the bidding at $90 per share. There was no advance on this figure, and Mr. Bradford secured the lot. The par value of the shares is $50, so it will be seen that investors have great faith in the continued prosperity of the Company.

SOME weeks ago we noted the formation of the South Framingham (Mass.) Gas, Fuel and Power Company, with a capital of $75,000, all of which has been paid in. The projectors have purchased a plot of ground from the Hon. Wm. Claflin, and construction work will be undertaken at once.

SOME days ago the Committee on Streets (Lawrence, Mass.) met to consider proposals that had been submitted for the public lighting. Tenders were put in by the Lawrence Gas Company to furnish 70 or more 2,000-candle power arcs, on the basis of $100 each per year, and by the Edison Illuminating Company, for 350 or more 20-candle power incandescent lights, at $1.50 each per month, to burn until midnight, and 150 or more (equal lighting value), to burn all night, at the rate of $2.04 per month each. A proposition of the Lawrence Gas Company to furnish 90 or more 1,200-candle power lamps, at the rate of $85 per year each, was rejected, whereupon both the former proposals were accepted. It is quite certain that the Gas Company now directs the policy of the local Edison Company.

IT is with no little satisfaction that we report the determination of the South Boston, Roxbury and Dorchester Gas Light Companies to make a substantial reduction in gas rates, the same to take effect from October 1st, next. The rates at present ruling in these suburban districts of Boston are as follows: South Boston, $2, with 10 per cent. off for prompt payment; Roxbury, $1.75, with a discount of 15 cents; Dorchester, $2, net. On October 1st the net rate will rule at $1.50, payment to be made within 12 days.

AT the semi-annual meeting of the Easthampton (Mass.) Gas Company the following officers were re-elected: President, E. T. Sawyer; Clerk and Treasurer, H. L. Clark; Directors, E. T. Sawyer, John Mayher and G. H. Leonard. An interim dividend of 5 per cent. was declared, making a return of 9 per cent. for the year. The matter of engaging in the supply of electric currents for light and power was discussed, with the result that the idea was referred to a committee (Messrs. Leonard, Manchester and Stowe) for investigation.

MANAGER PEARSON, of the Consumers Gas Company, Toronto, is looking up the possibilities involved in the construction of a gas works for the supply of gas to the residents of the outlying suburb known as Center Island. If the outlook is satisfactory, and it is more than likely that the survey will justify the erection of the works, the projectors will also establish there a crematory for the incineration of the garbage of Toronto.

THE Omaha (Neb.) Gas Company has adopted a nickel badge as a ready means for the identification by consumers of its employees whose duties require them to visit the residences of the former.

ELSEWHERE we note the submission of bids for the public lighting of San Francisco, and the reference of the same to a committee. We can now state that the awards (to last for one year) were made on the basis of the tenders as reported.

COAL mining as carried on in France is very remunerative to the colliery proprietors. The average dividend of 12 leading collieries amounted, in 1888, to 65.59 cents per ton of output.

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To put the best

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Six 12-Inch Chapman Valves.

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A Small Gas Works,

By a practical gas man. Address
784-8 "W. E. F." care this Journal.

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Two Lowe Water Gas Generators, 5 ft. diameter, with Superheaters 4 ft. diam., valves, etc; in good order.
One No. 7 Sturtevant Blower.
One 16-Inch Connelly Automatic Governor for Street Mains.
One Gasholder, 70 ft. diam. and 16 ft. deep.
One Telescopic Gasholder, 50 ft. high, 71 ft. diam; in good condition.
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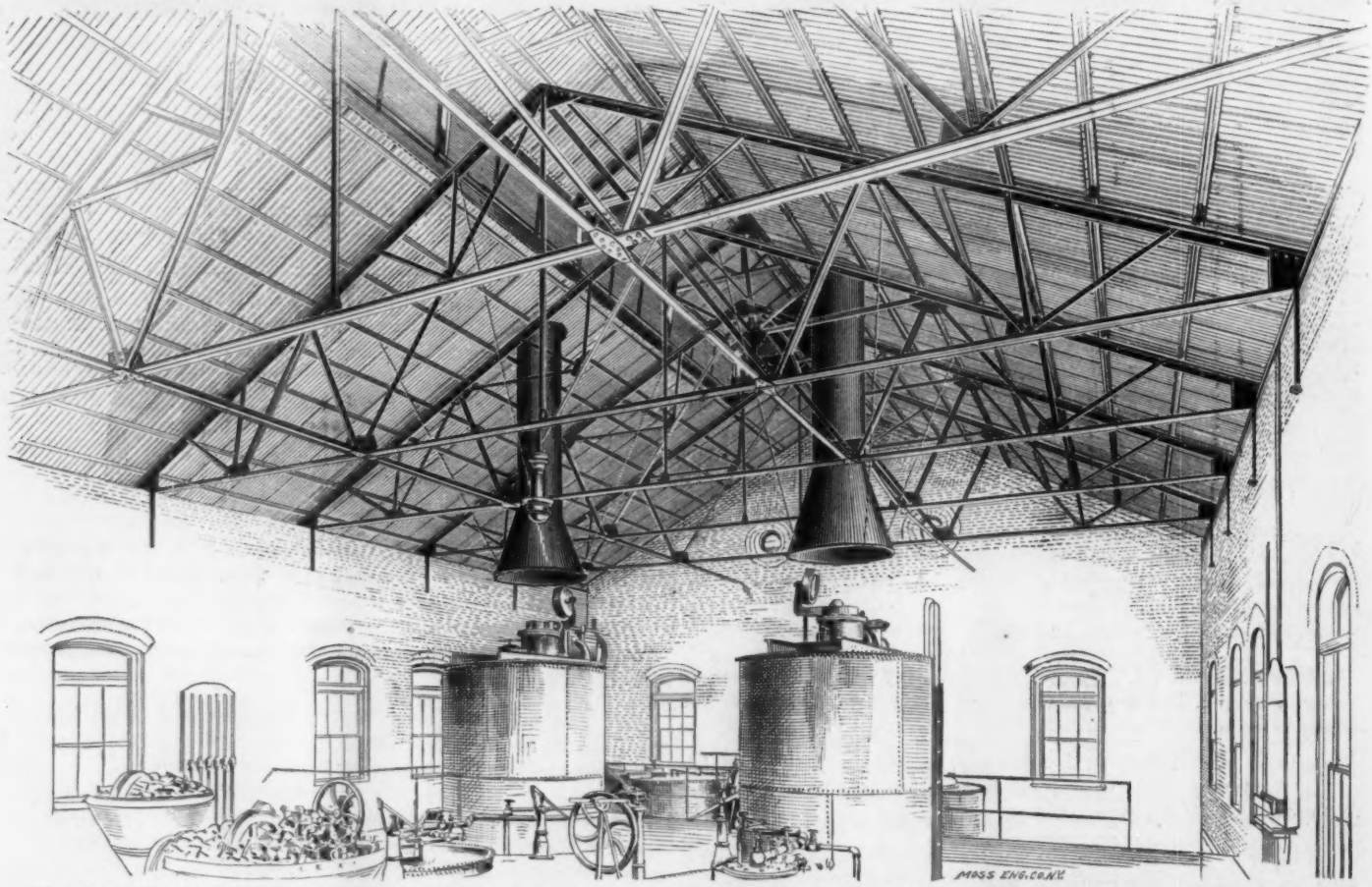

The above illustration is taken direct from a photograph of an iron roof built by us for the Providence Gas Company, at Providence, R. I. The roof is built entirely of iron—iron trusses, iron purlins, covered with corrugated iron. There is not a particle of woodwork anywhere about the roof, thus making it absolutely fireproof. Notice that along the peak of the roof there is a corrugated iron ventilator, with iron shutters opening and closing by cords from the floor, thus securing perfect ventilation. *Write for Illustrated Catalogue.*

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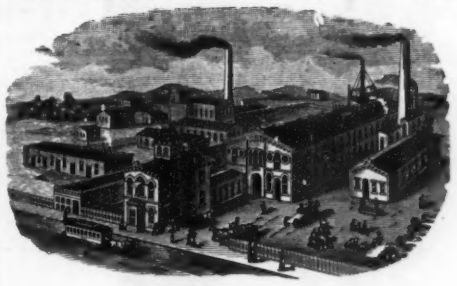

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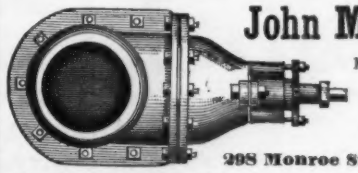

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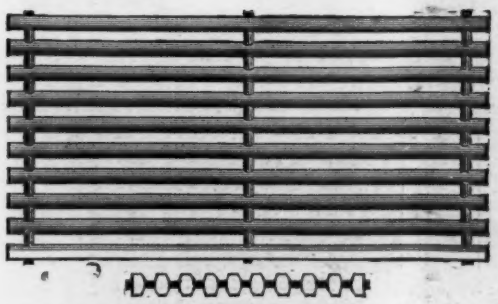

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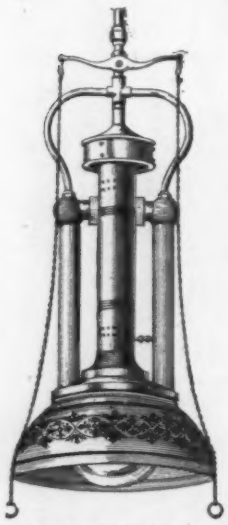
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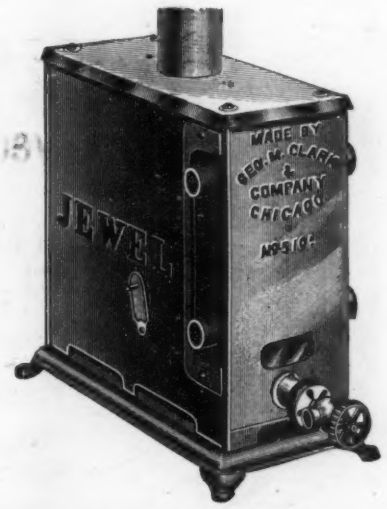

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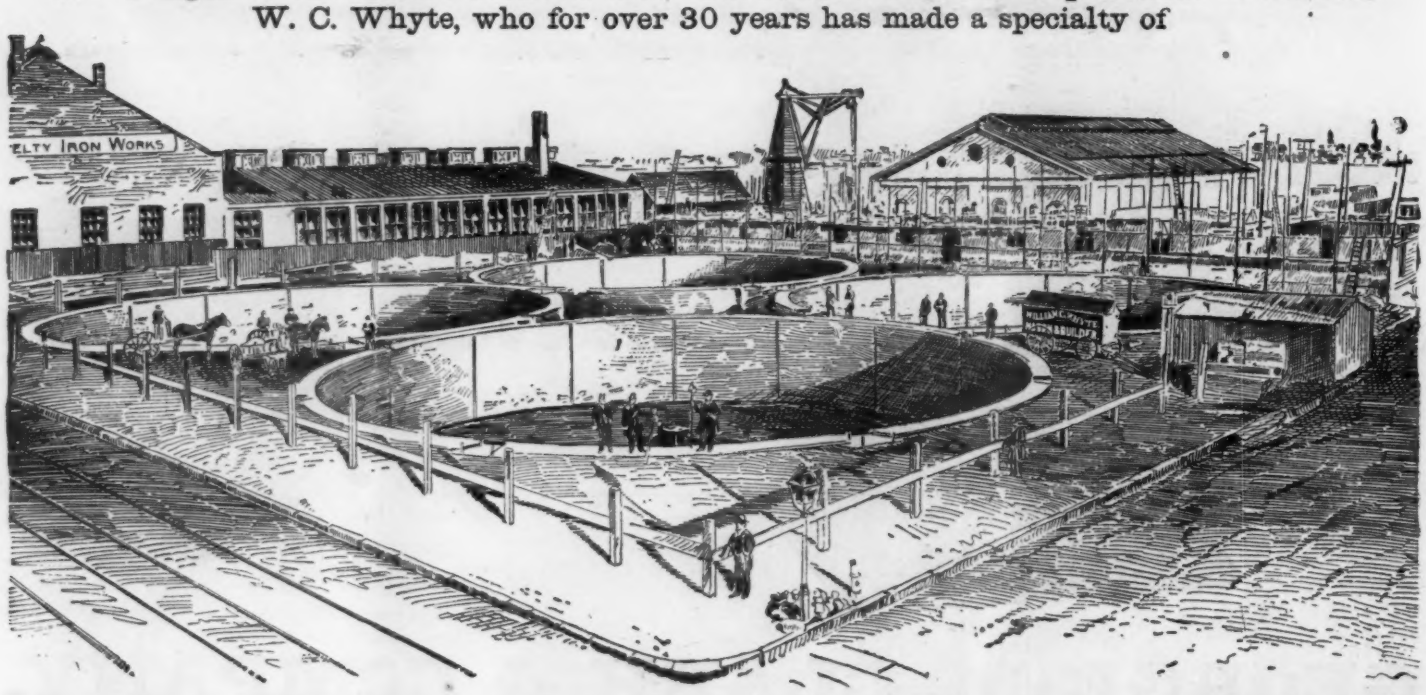

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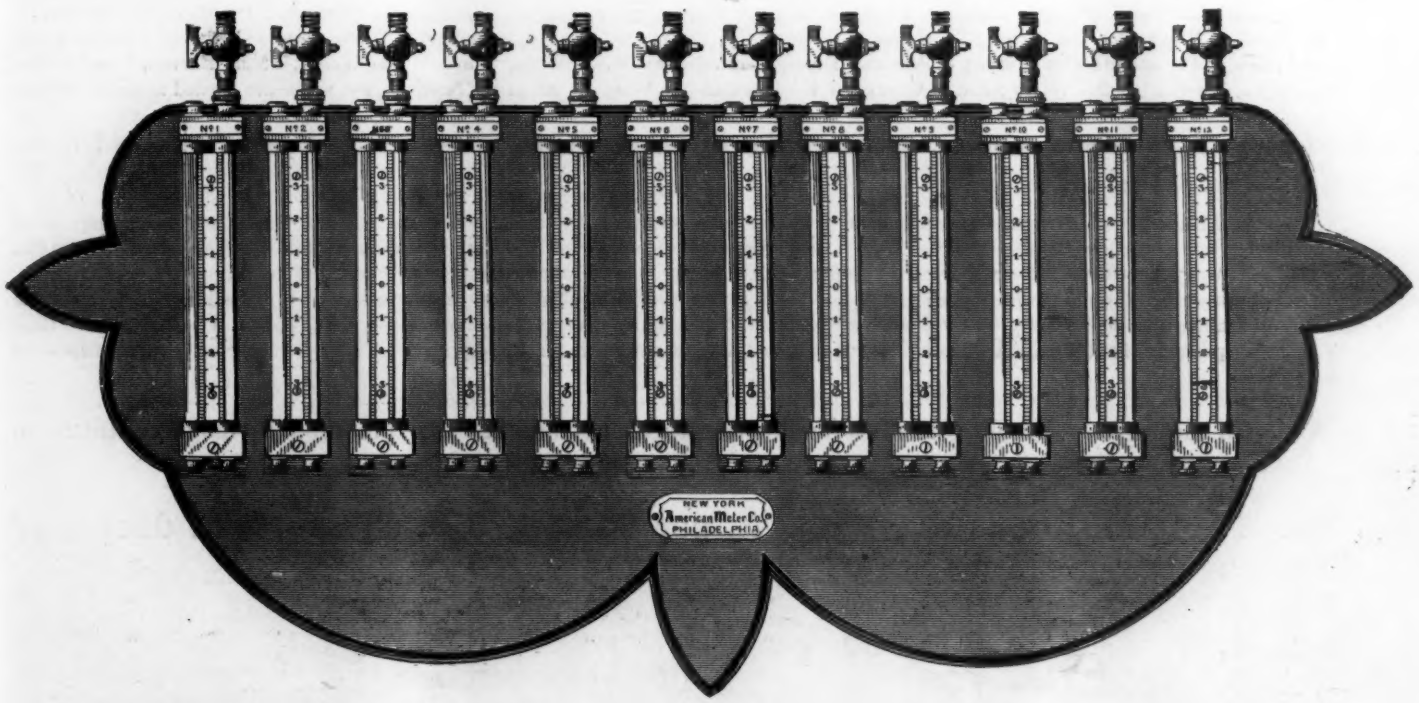

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WALKER TAR AND CARBONIC ACID EXTRACTOR.

A very general demand exists, in both large and small Gas Works, for an apparatus that will be absolutely efficient in the removal of the tar which passes the hydraulic main and condenser. Many attempts have been made to accomplish this, but, I believe, without success, until the introduction, five years ago, in England, of the C. & W Walker Patent Tar and Carbonic Acid Extractor. During these years this apparatus has been adopted by many of the most prominent Engineers, not only in England, but also on the Continent of Europe and in other parts of the world. It is only necessary to give here a partial list in order to convince any intelligent American Gas Engineer that this machine must have succeeded fully in accomplishing the desired results.

The following Engineers have personally given permission to refer to them:

G. C. Trewby, Esq., Engineer-in-Chief of the Gas Light and Coke Co., London. The manufacturing plant at Beckton is built in complete sections of 3,000,000 cubic feet capacity each. A Walker Tar Extractor has been fitted to each one of these sections. This was done after a long and thorough trial on one of its sections. The Tar Extractor has been supplied to other works of the Gas Light and Coke Co., including those of which John Methven, Engineer of the Gas Light and Coke Co. at the Nine Elms Station, is in charge. Also to G. E. Stevenson, Peterborough Gas Works; B. Green, Mitcham and Wimbledon Gas Works; W. H. Smith, Bedford Gas Works; F. Linging, Norwich Gas Works; J. T. Browning, Colchester Gas Works; S. B. Darwin, Portsmouth Gas Works; J. McCrae, Dundee Gas Works; W. J. Wells, Stamford Gas Works; J. M. Darwin, Longton Gas Works; J. Paterson, Warrington Gas Works; and J. Coulter, of the Dundalk Gas Works. All of the foregoing gas works are located in Great Britain.

Mr. Charles A. Gerdenier, Superintendent of the Bridgeport (Conn.) Gas Light Company, writes as follows, under date of Dec. 3, 1887:

"The C. & W. Walker Tar and Carbonic Acid Extractor has been in operation at these works for the past six weeks, and is an unqualified success. It removes every particle of Tar from the gas in once passing through the apparatus and a large percentage of the Carbonic Acid. I also feel quite sure that it prevents the formation and deposit of Naphthaline, because since I started the Washer I have had no stoppages from this cause. These works have been seriously troubled with Tar for many years, and I have used several kinds of apparatus and every expedient which has come to my attention for dealing with the difficulty, but without success. The Walker apparatus occupies comparatively small space, is less expensive than other systems, and requires but little attention. I carry 2½-inch seal, and have an automatic tar delivery valve. This Tar Extractor is indispensable to gas makers."

I have taken the Agency for the United States for this apparatus, and am now prepared to make contracts to erect it on the premises of any Gas Company. It would be manufactured in the following sizes:

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No. 2,	"	"	125,000	"	"	"	4	"	"	" "
No. 3,	"	"	250,000	"	"	"	5	"	"	" "
No. 4,	"	"	500,000	"	"	"	6	"	"	" "
No. 5,	"	"	750,000	"	"	"	7	"	"	"
No. 6,	"	"	1,000,000	"	"	"	8	"	"	"
No. 7,	"	"	1,250,000	"	"	"	9	"	"	" "
No. 8,	"	"	1,500,000	"	"	"	10	"	"	"
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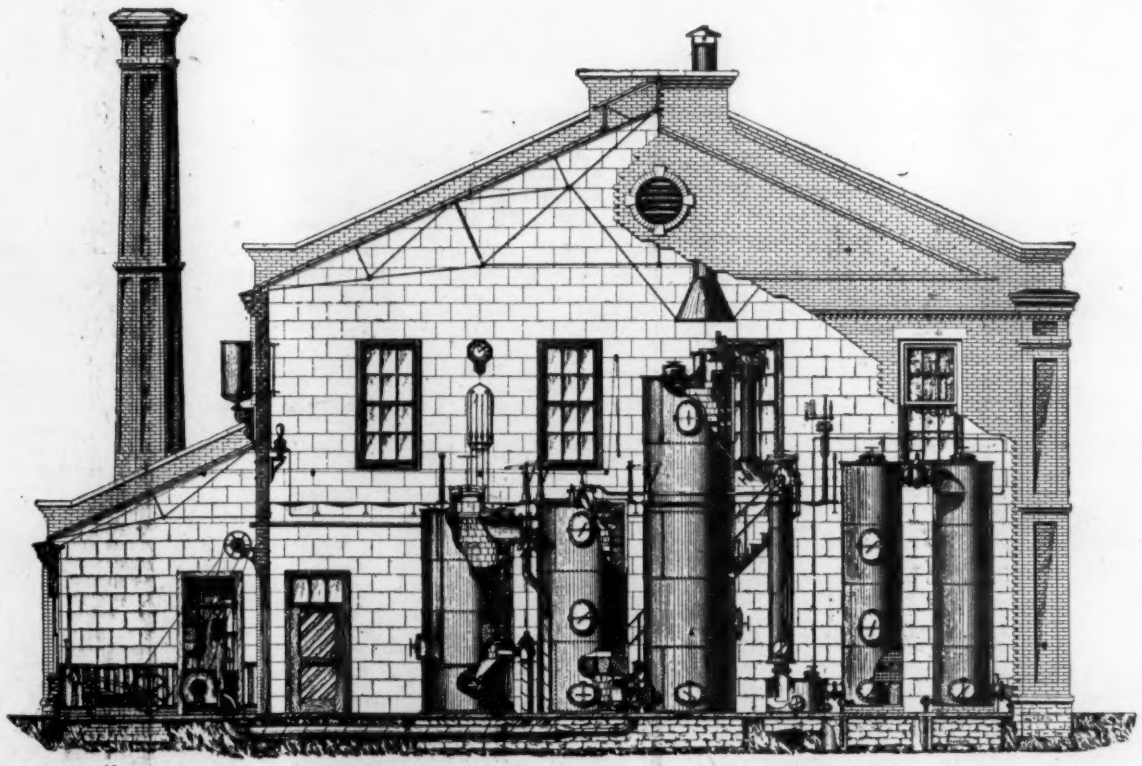

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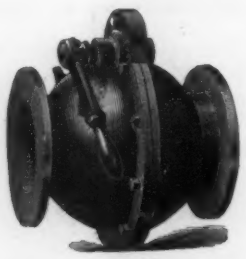

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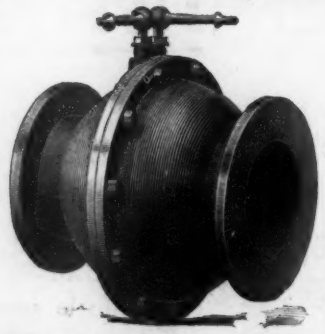

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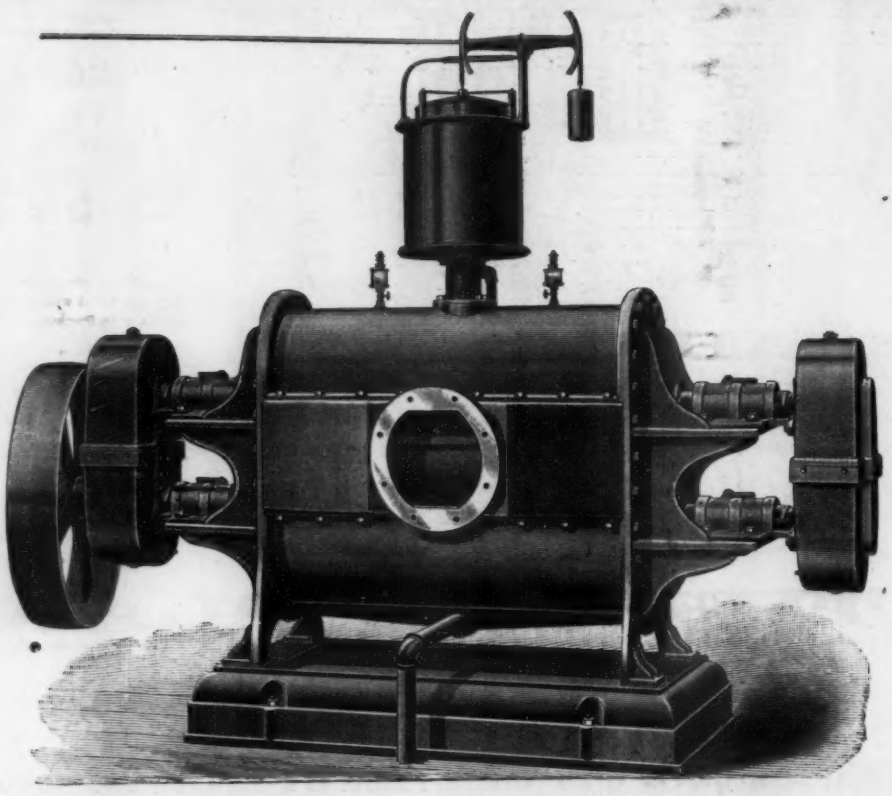

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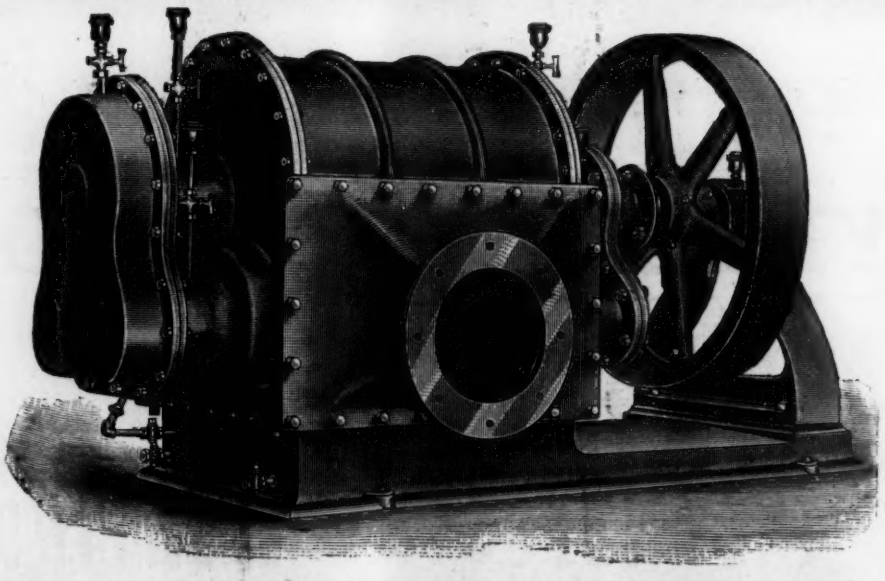

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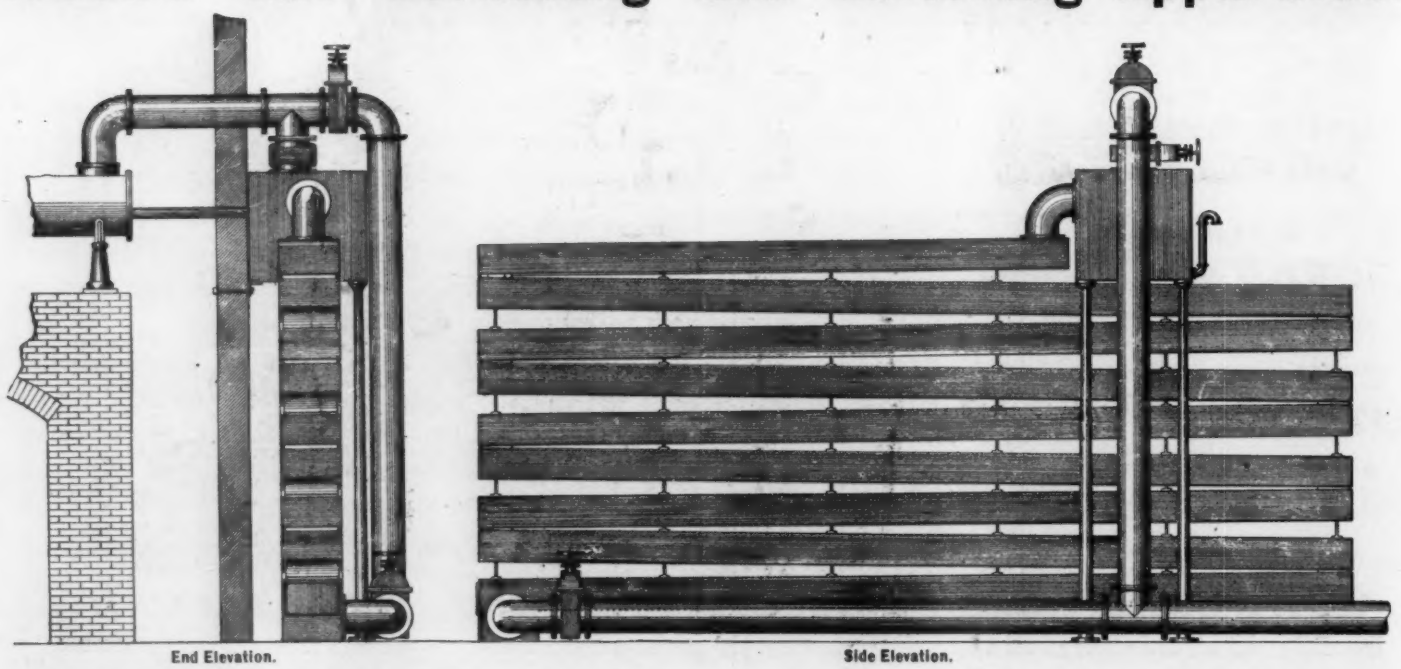

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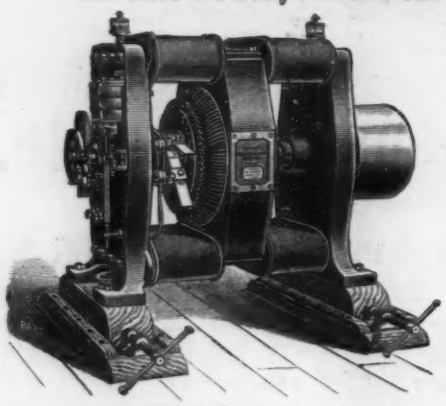

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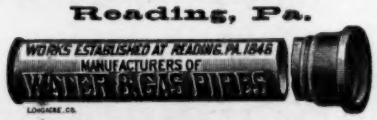

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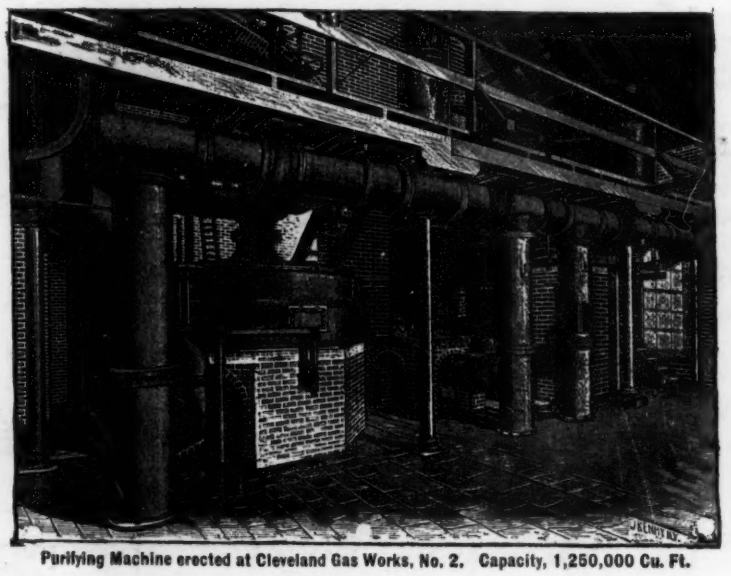

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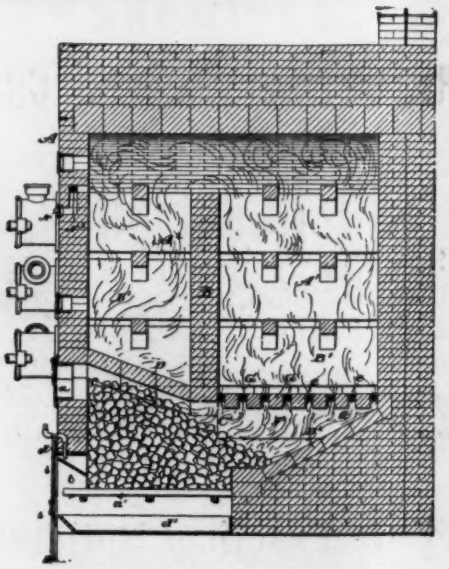

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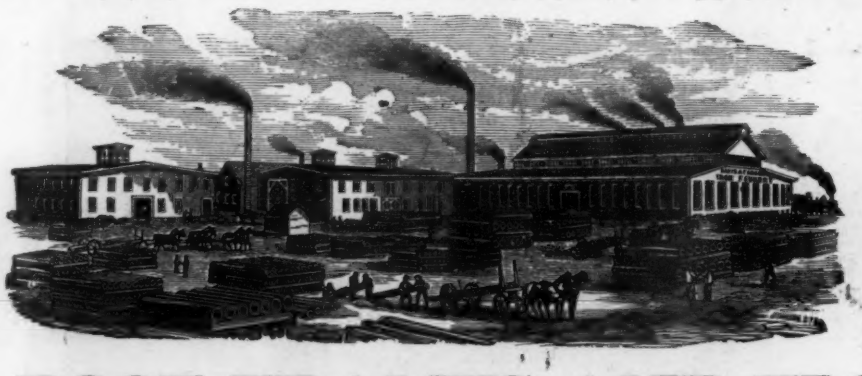

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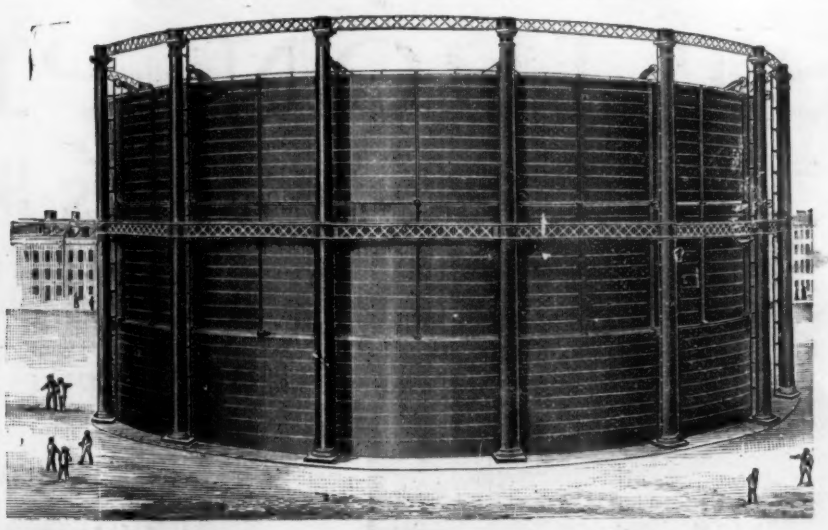

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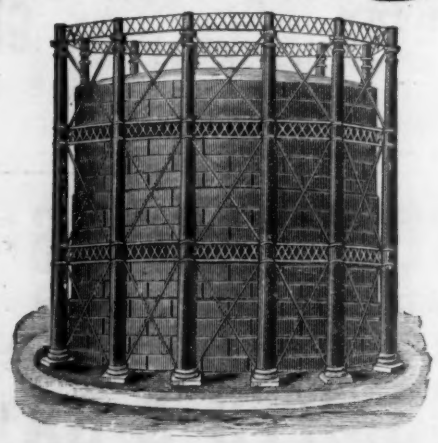

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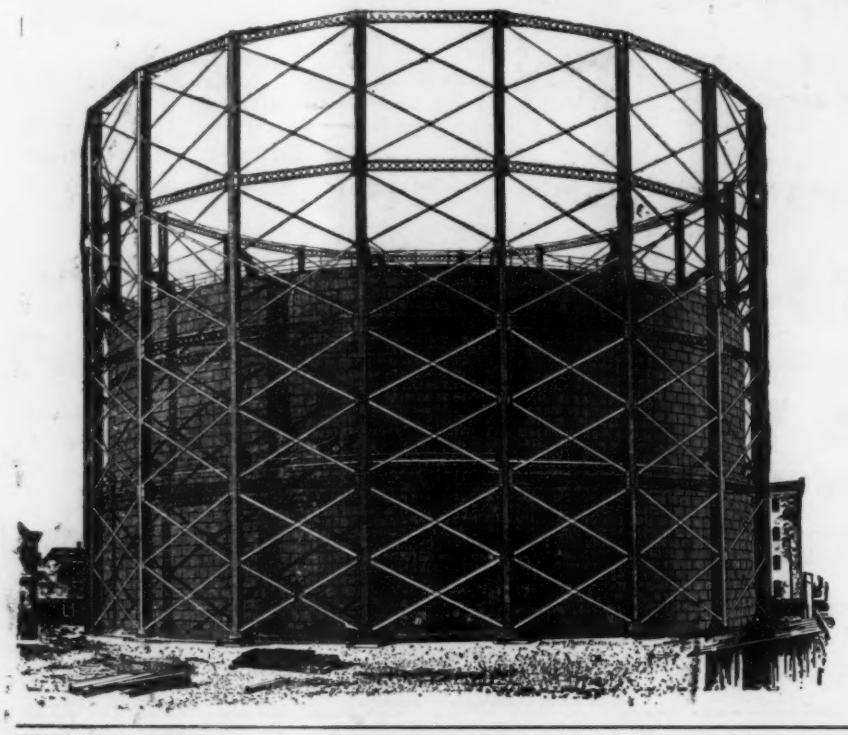

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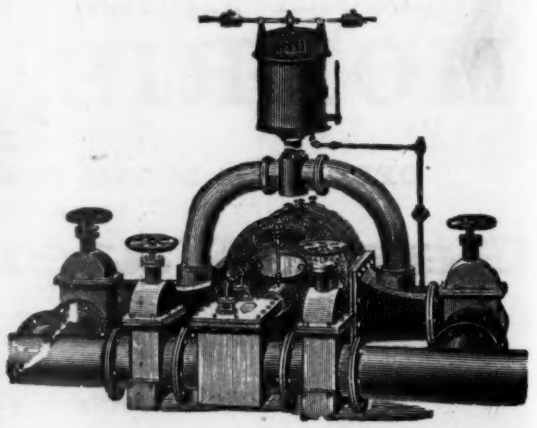

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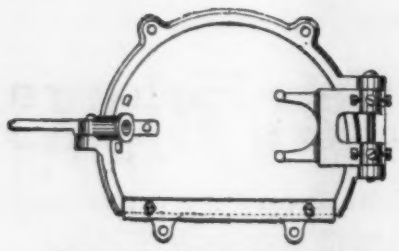

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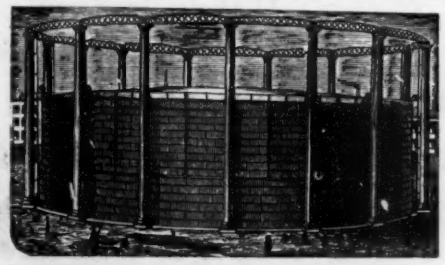
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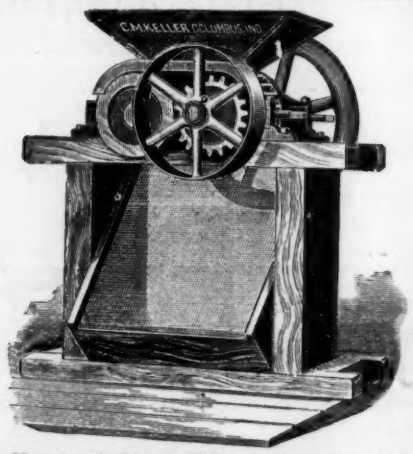

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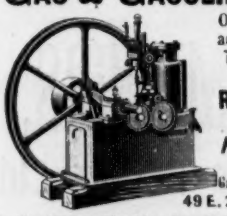

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The Most Economical, Efficient, and Durable Gas Stove Made.

GAS COOKING STOVE, No. 8 C.

SIZE.

Stove.	Oven.	Roaster.	Top.	Length over Extension Shelves,
37 in. high.	12 in. high.	12 in. high.	24 in. long.	36 in.
20 in. wide.	17¼ in. wide.	18 in. wide.	21 in. wide.	
	12 in. deep.	13 in. deep.		

This Stove has four burners on top, and double oven burner.

Consumption of gas with all burners in use, 42 feet per hour, at 1 inch pressure.

The top is made in sections, so that a greater variety of cooking utensils may be used. By lifting out the covers and crosspieces and putting in a suitable forked ring, which is sent with each stove, a wash boiler or other large utensil may be set over two burners. Our **No. 87 GRIDDLE** also fits in the same position. The roasting oven is provided with a cast-iron door.

All Fittings are Nickel-Plated.

GAS COOKING STOVE, No. 7 B.

SIZE.

Stove.	Oven.	Roaster.	Top.	Length over Extension Shelves,
31 in. high.	9½ in. high.	10 in. high.	21 in. long.	32 in.
17 in. wide.	14½ in. wide.	15 in. wide.	16 in. wide.	
	12 in. deep.	13 in. deep		

This Stove has three boiling burners in the Top or Hot Plate, and one single oven burner.

This cut represents our New Style Cooking Stove. As will be seen, it has an ornamented cast-iron Base and Front, and extension shelves. The Oven Burner, which is atmospheric (unless otherwise ordered), is of an entirely new and improved pattern (patent). The ovens are of greater capacity than those of the old style. The Top, in conjunction with the Outlet Pipe, is designed to carry off all the products of combustion, if desired, but they are also supplied with a loose ring which converts it into an ordinary open top stove.

The consumption of this Stove is 35 cubic feet per hour at 1 inch pressure, with all Burners in use.

All Fittings are Nickel-Plated.

"RADIANT" BOILING STOVE, WITH REGENERATIVE BURNER.

Size, 6½ inches diameter, 9 inches high. Consumption, 6 feet per hour at 1 in. pressure.

HOT PLATE, No. 111.

Size, 36 in. long, 12 in. wide, with three double burners, 6 taps.

Consumption, with all burners in use, 90 cubic feet per hour, with 1 in. pressure.

½ in. supply pipe should be used where the pressure is 1 in. or over.